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An updated checklist of the Hydradephaga of Switzerland (Coleoptera)

Vivien Cosandey[1], Yannick Chittaro[2], Andreas Sanchez[2]

1 *Muséum d'histoire naturelle, Malagnou 1, CH-1208 Genève, Switzerland*
2 *info fauna, Avenue Bellevaux 51, CH-2000 Neuchâtel, Switzerland*

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Corresponding author: Vivien Cosandey (vivien.cosandey@bluewin.ch)

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Abstract

An updated checklist of the Swiss species of Hydradephaga (Dytiscidae, Gyrinidae, Haliplidae, Hygrobiidae, Noteridae) is presented and briefly discussed. A total of 139 species is retained as part of the Swiss fauna, while 53 species, which have been recorded in Switzerland in the past, are excluded from this list, either due to insufficient documentation or because their records were based on misidentified material. In contrast to previous works, the present study also provides, for the first time, distribution maps through an online map server for all Hydradephaga species in Switzerland, based on over 43,000 occurrences obtained from specimens held in museums and private collections, as well as literature data. The occurrences of the rarest species of Switzerland, as well as data on species erroneously cited in Switzerland, are presented and discussed.

Key Words

Insecta, diving beetles, Burrowing Water Beetles, Whirligig Beetles, Crawling Water Beetles, species list, new country records, faunistics, distribution

Introduction

The order Coleoptera is divided into five suborders: Protocoleoptera (extinct), Adephaga, Polyphaga, Myxophaga, and Archostemata (Bouchard et al. 2011). A large proportion of aquatic beetles belong to Adephaga and are often referred to as Hydradephaga in opposition to Geadephaga. The monophyly of Hydradephaga has been debated for long; some authors found it to be a monophyletic group (Ribera et al. 2002; McKenna et al. 2015; López-López and Vogler 2017), while others found it to be a paraphyletic group with Geadephaga nested inside (Maddison et al. 2009; McKenna et al. 2019) or with Gyrinidae as basal lineage and the rest of Hydradephaga monophyletic (Beutel et al. 2008; Baca et al. 2017). Recent studies based on morphology as well as genomic data support this last hypothesis (Vasilikopoulos et al. 2021). For practical reasons, Hydradephaga is still used in the present work even if it does not concern a natural group. Worldwide, ca. 6,000 species have been described in eight families and it represents a taxonomically diverse groups with one of the most well-known evolutionary history (Short 2018). The taxonomy of this group has always been of great interest to professional and amateur entomologists (Short 2018), and it is estimated that 70% of aquatic beetles (including non-Adephagous) have been described (Jäch and Balke 2008), while 80% of Dytiscidae are already named (Nilsson 2016).

Although there are rare terrestrial species (notably a few species of Dytiscidae in the tropics, see Brancucci 1979b; Balke and Hendrich 1996), all Hydradephaga in Switzerland are aquatic, occurring in various types of standing and flowing water. Most Hydradephaga are predaceous and occasionally necrophorous, both as larvae and adults. Haliplidae are a notable exception with herbivorous larvae and carnivorous, ominivorous, or exclusively phytophagous adults (van Vondel 1997). Most species are fully winged and capable of flight (Jackson 1952; Kehl and Dettner

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2007). Adults of some species can live for several years (Cerrato and Meregalli 2020) and usually overwinter buried in the ground, out of water (Hájek 2009).

In Switzerland, Hydradephaga are represented by five families: Dytiscidae, Gyrinidae, Haliplidae, Hygrobiidae, and Noteridae. Faunistic knowledge about Hydradephaga has been summarized by Carron (2005, 2008), who published two checklists: the first concerning Dytiscidae and Noteridae (Carron 2005), and the second Gyrinidae, Haliplidae, and Hygrobiidae (Carron 2008). These checklists were critical of dubious records such as specimens from Charles Maerky's collection (see below and Monnerat et al. 2015), rightly excluding many taxa from the Swiss list. However, Carron (2005, 2008) did not base his works on the acquisition of an extensive dataset, and thus he could only give general distribution information for some very rare species and did not present distribution maps. Facing the need for quality datasets permitting extrapolation of ecological information and visualization of the distributions of species, particularly for good bioindicators (Bilton et al. 2019) such as Hydradephaga, we compiled all the occurrences available in all Swiss museums and private collections, as well as the literature and data gathered by naturalists. We also present an updated and annotated checklist of the Hydradephaga species present in Switzerland. Resident species are thus distinguished from species mistakenly mentioned for Switzerland or insufficiently documented.

Material and methods

To present a comprehensive list of the Swiss Hydradephaga and distribution maps based on all existing information, we performed an exhaustive revision and examination of the relevant material housed in all Swiss natural history museum collections following the same methodology used for other beetle groups (e.g., Chittaro et al. 2021; Sanchez and Chittaro 2022). The collections in the following museums were studied (the contact person is reported in parentheses after each institution):

AGRO Agroscope-Changins, Nyon (Stève Breitenmoser)
BNM Bündner Natur-Museum, Chur (Stephan Liersch)
ETH Eidgenössische-Technische Hochschule, Zürich (Michael Greeff)
HGSB Musée de l'Hospice du Grand-Saint-Bernard (Jean-Pierre Voutaz)
KMLI Archäologie und Museum Baselland, Liestal (Marc Limat)
LEBA Laboratoire d'écologie et de biologie aquatique, Université de Genève (Emmanuel Castella)
MHNF Musée d'histoire naturelle de Fribourg (Sophie Giriens)
MHNG Muséum d'histoire naturelle, Genève (Giulio Cuccodoro)
MHNN Musée d'histoire naturelle de Neuchâtel (Jessica Litman)
MHNS Musée de la nature du Valais, Sion (Sonja Gerber)
MSNL Museo cantonale di storia naturale, Lugano (Bärbel Koch)
MZL Naturéum (formerly: Musée cantonal de zoologie), Département de zoologie, Lausanne (Anne Freitag)
MZA Museum zu Allerheiligen, Schaffhausen (Urs Weibel)
NMAA Naturama, Aarau (Christian Sprecher)
NMB Naturhistorisches Museum Basel (Matthias Borer)
NMBE Naturhistorisches Museum Bern (Hannes Baur)
NMLU Natur-Museum, Luzern (Marco Bernasconi)
NMO Naturmuseum Olten (Pia Geiger)
NMSG Naturmuseum St. Gallen (Karin Urfer)
NMTG Naturmuseum Thurgau, Frauenfeld (Barbara Richner)
NMSO Naturmuseum, Solothurn (Marc Neumann)
NMWI Naturhistorisches Museum, Winterthur (Sabrina Schnurrenberger)

We also cited data gathered from four museums outside Switzerland:

MCB Museo civico di Bolzano, Italy
MHNL Musée Guimet d'histoire naturelle, Lyon
MHNP Musée national d'Histoire naturelle, Paris
SMNS Staatlichen Museum für Naturkunde Stuttgart, Germany

Moreover, we included data from the private collections of the authors, as well as those of the following professional and amateur entomologists: Emil Birnstiel (Zurich ZH), Mickaël Blanc (Sciez France), Hansjörg Brägger (Bischofszell TG), Berndt Eismann (Kreuzlingen TG), Christian Monnerat (Neuchâtel NE), Arnaud Vallat (La Chaux-de-Fonds NE), and André Wagner (Le Sentier VD). Data from the following institutions were also considered: Association de la Grande-Cariçaie AGC (Sophie Marti, Gaël Pétremand, Antoine Gander), Haute école du paysage, d'ingénierie et d'architecture de Genève HEPIA (Beat Oertli, Eliane Demierre) and of the Office cantonal de l'eau, Genève OCEau (Arielle Cordonier).

All available data from the literature relevant for Switzerland were also considered. The references from these publications are included in the bibliography if they are specifically cited in the text. Publications consulted but not cited in the text are not mentioned.

We followed the nomenclature and systematics of the "Catalogue of Palaearctic Coleoptera" (Hájek 2017a, b, c; Hájek and Fery 2017; van Vondel 2017). The list of the main synonyms of each taxon is provided in the references and is therefore not reported here.

The specimens were identified using the following publications: Holmen (1987), Foster and Friday (2011), Freude (2011), and Nilsson and Holmen (1995). An illustration of each species is provided in Hájek's iconographies (2007, 2009).

When not otherwise specified, general information on species' distributions is taken from the "Catalogue of Palaearctic Coleoptera" (Löbl and Löbl 2017). We have also used the relevant literature concerning the countries and regions adjacent to Switzerland, such as Franciscolo (1979) for Italy and the regional treatment of Kahlen and Hellrigl (1996) for South Tyrol/Alto Adige; Guignot (1947) and Bameul and Queney (2014) for France and regionally Callot (1990, 2018) for Alsace; Köhler and Klausnitzer (1998), Köhler (2000, 2011), and Bleich et al. (2016) for Germany; as well as Brandstetter and Kapp (1995) for Vorarlberg (Austria) and Liechtenstein.

Once an exhaustive list of species was compiled, we followed the procedure proposed by Monnerat et al. (2015) in order to assess which of these species should be considered as belonging to the Swiss fauna. We only retained species whose relative data were deemed sufficient (unambiguous labeling, reliable collections, etc.) for inclusion on the national checklist.

Those species whose presence in Switzerland is substantiated by less than 30 valid observations are subject to an additional comment. In these cases, species names in the table are followed by a letter and a number in bold ("**C1**" for example) and all the examined specimens and published observations are mentioned in order to document and justify the presence of these species in the checklist. Unless otherwise specified, all examined material was identified or reviewed by the first author.

Reliable identification is based on characters of the male genitalia for some of *Haliplus* spp. and to distinguish some highly similar species groups found in *Agabus* spp. For those species, only dissected males were counted as "verified" records, while records based exclusively on female specimens were omitted as unverifiable.

The specimens and literature-based records presented here are listed in chronological order of discovery (or publication date) and then in alphabetical order by locality, depending on available information. All occurrences are cited according to the following scheme: number of specimens, locality (pre-2000 data) or municipality and abbreviated canton (post-2000 data), date, collector, determinator (in the case that the determinator was not one of the authors), collection and official acronym of the institution where the specimen is deposited.

Information about localities and dates are reported as found on the labels. Interpretations of alphabetical abbreviations are placed within square brackets ("[ ]"). In old collections, the collector (leg.) is not always explicitly labelled. In such cases, we favored the « coll. » tag. In some cases, the original collection holder was not labelled but we were nonetheless able to identify the source of the collection based on type labels and/or handwriting.

The collection of Charles Maerky, deposited in the MHNG, has long been considered problematic (Monnerat et al. 2015). In addition to specimens coming from his personal collection ("coll. Maerky C."), it also contains insects from other sources (labelled, for instance, as "ex coll. Melly A.") but lacking any original labels. In such cases, we maintained the "coll. Maerky C." mention for his whole collection to ensure the association of these samples with the Maerky C. collection.

For literature-based data, detailed under "Published data", we retained the locality as it appeared in the original citation. We consider the "source" of the records to be the author of the publication, for example: "Ormontsthal by Venetz I. (Stierlin and Gautard 1867)". If the same records have been published more than once, then only the oldest publication is retained, given that localities in later publications are often altered and sometimes truncated.

Among the data cited in this paper under "Examined material" or "Published data", we inserted a superscript number code before those entries we considered insufficiently documented to be retained, using the following code to describe error type (following Monnerat et al. 2015). Thus, if one of the following eight criteria is fulfilled, a record is considered as doubtful:

1. data source cannot be verified
2. incorrect identification
3. specimen from problematic collection
4. specimen of unknown origin but attributed to a Swiss locality
5. double labelling, original locality misinterpreted or incorrectly copied
6. confusion between localities: original finding, breeding or hatching place and collection storage site
7. non-Swiss localities or potentially Swiss localities that share their names with foreign place names (and thus of dubious Swiss origin)
8. chorological or ecological inconsistencies

Abbreviations used: **coll.** = collection, **det.** = determinator, **ex.** = specimen, **leg.** = collector. Abbreviated Swiss cantons (only cantons cited in the text): **AG** = Aargau, **BE** = Bern, **BL** = Basel-Landschaft, **FR** = Fribourg, **GE** = Geneva, **GR** = Grisons, **JU** = Jura, **NE** = Neuchâtel, **OW** = Obwald, **SG** = St. Gallen, **SH** = Schaffhausen, **SO** = Solothurn, **TI** = Ticino, **TG** = Thurgau, **UR** = Uri, **VD** = Vaud, **VS** = Valais, **ZH** = Zurich.

Results

Swiss Hydradephaga list

For the basis of this work, we compiled 43,770 Swiss occurrences of Hydradephaga. In total, 72% of them concern specimens deposited in museums, 8% come from the literature, and 20% from other sources (private collectors, volunteer observers, research institutes, or ecology offices).

The 139 species of Hydradephaga listed in bold and without square brackets "[ ]" currently do or formerly did form populations in Switzerland, even if only scant information is available for many of them. The most spe-

cies-rich family is Dytiscidae (113 species), followed by Haliplidae (16 species), Gyrinidae (7 species), Noteridae (2 species), and Hygrobiidae (1 species).

On the other hand, the 53 species listed in square brackets "[ ]" should not be considered as belonging to the Swiss fauna until new data show otherwise. In this category, we placed species whose individuals come from problematic collections, such as Charles Maerky's or Max Täschler's (Monnerat et al. 2015), and those that were erroneously mentioned for Switzerland due to incorrect identifications and those cited in old publications, like Stierlin and Gautard (1867), without reference to specific individuals and consequently considered doubtful. Other species may eventually be found in the Swiss territory but currently available data are not sufficient to confirm their establishment in Switzerland.

To facilitate searching for species in this document, taxa appear in alphabetical order for families, subfamilies, tribes, subtribes, genera, subgenera, species, and subspecies.

Updated distribution maps of these species are available on the info fauna cartographic server (https://lepus.infofauna.ch/carto/). All the valid data are also available on http://www.GBIF.org (https://doi.org/10.15468/dl.env254).

Checklist of the Swiss species

DYTISCIDAE Leach, 1815
Agabinae C.G. Thomson, 1867
Agabini C.G. Thomson, 1867
[*Agabus* (*Acatodes*) *arcticus arcticus* (Paykull, 1798)] **C1**
***Agabus* (*Acatodes*) *congener* (Thunberg, 1794)**
***Agabus* (*Acatodes*) *lapponicus* (C.G. Thomson, 1867)**
***Agabus* (*Acatodes*) *sturmii* (Gyllenhal, 1808)**
[*Agabus* (*Acatodes*) *thomsoni* (J.R. Sahlberg, 1871)] **C2**
***Agabus* (*Agabus*) *labiatus* (Brahm, 1790)**
***Agabus* (*Agabus*) *uliginosus* (Linnaeus, 1760)**
***Agabus* (*Agabus*) *undulatus* (Schrank, 1776)**
***Agabus* (*Gaurodytes*) *affinis* (Paykull, 1798)**
***Agabus* (*Gaurodytes*) *biguttatus* (Olivier, 1795)**
***Agabus* (*Gaurodytes*) *bipustulatus* (Linnaeus, 1767)**
***Agabus* (*Gaurodytes*) *brunneus* (Fabricius, 1798) C3**
***Agabus* (*Gaurodytes*) *didymus* (Olivier, 1795)**
***Agabus* (*Gaurodytes*) *guttatus guttatus* (Paykull, 1798)**
***Agabus* (*Gaurodytes*) *melanarius* Aubé, 1837**
***Agabus* (*Gaurodytes*) *nebulosus* (Forster, 1771)**
***Agabus* (*Gaurodytes*) *paludosus* (Fabricius, 1801)**
[*Agabus* (*Gaurodytes*) *striolatus* (Gyllenhal, 1808)] **C4**
***Ilybius aenescens* C.G. Thomson, 1870**
***Ilybius ater* (De Geer, 1774)**
***Ilybius chalconatus* (Panzer, 1796)**
***Ilybius crassus* C.G. Thomson, 1856 C5**
***Ilybius erichsoni* (Gemminger & Harold, 1868) C6**
***Ilybius fenestratus* (Fabricius, 1781)**
***Ilybius fuliginosus fuliginosus* (Fabricius, 1792)**
***Ilybius guttiger* (Gyllenhal, 1808)**
[*Ilybius meridionalis* Aubé, 1837] **C7**
[*Ilybius montanus* (Stephens, 1828)] **C8**
***Ilybius neglectus* (Erichson, 1837) C9**
***Ilybius quadriguttatus* (Lacordaire, 1835)**
[*Ilybius similis* C.G. Thomson, 1856] **C10**
***Ilybius subaeneus* Erichson, 1837 C11**
[*Ilybius subtilis* Erichson, 1837] **C12**
***Platambus maculatus* (Linnaeus, 1758)**

Colymbetinae Erichson, 1837
Colymbetini Erichson, 1837
***Colymbetes fuscus* (Linnaeus, 1758)**
[*Colymbetes striatus* (Linnaeus, 1758)] **C13**
[*Meladema coriacea* Laporte, 1835] **C14**
***Rhantus* (*Nartus*) *grapii* (Gyllenhal, 1808)**
***Rhantus* (*Rhantus*) *bistriatus* (Bergsträsser, 1777) C15**
[*Rhantus* (*Rhantus*) *consputus* (Sturm, 1834)] **C16**
***Rhantus* (*Rhantus*) *exsoletus* (Forster, 1771)**
***Rhantus* (*Rhantus*) *frontalis* (Marsham, 1802) C17**
***Rhantus* (*Rhantus*) *latitans* Sharp, 1882**
***Rhantus* (*Rhantus*) *notaticollis* (Aubé, 1837) C18**
***Rhantus* (*Rhantus*) *suturalis* (W.S. Macleay, 1825)**
***Rhantus* (*Rhantus*) *suturellus* (Harris, 1828) C19**

Copelatinae Branden, 1885
Copelatini Branden, 1885
***Liopterus haemorrhoidalis* (Fabricius, 1787)**

Cybistrinae Sharp, 1880
Cybistrini Sharp, 1880
***Cybister* (*Cybister*) *lateralimarginalis lateralimarginalis* (De Geer, 1774)**

Dytiscinae Leach, 1815
Aciliini C.G. Thomson, 1867
***Acilius* (*Acilius*) *canaliculatus* (Nicolai, 1822)**
***Acilius* (*Acilius*) *sulcatus* (Linnaeus, 1758)**
***Graphoderus austriacus* (Sturm, 1834) C20**
***Graphoderus bilineatus* (De Geer, 1774)**
***Graphoderus cinereus* (Linnaeus, 1758)**
***Graphoderus zonatus zonatus* (Hoppe, 1795) C21**

Dytiscini Leach, 1815
***Dytiscus circumcinctus* Ahrens, 1811 C22**
***Dytiscus circumflexus* Fabricius, 1801 C23**
***Dytiscus dimidiatus* Bergsträsser, 1777 C24**
[*Dytiscus lapponicus* Gyllenhal, 1808] **C25**
***Dytiscus latissimus* Linnaeus, 1758 C26**
***Dytiscus marginalis marginalis* Linnaeus, 1758**
***Dytiscus semisulcatus* O.F. Müller, 1776**

Eretini Crotch, 1873
[*Eretes sticticus* (Linnaeus, 1767)] **C27**

Hydaticini Sharp, 1882
[*Hydaticus* (*Hydaticus*) *aruspex* Clark, 1864] **C28**
[*Hydaticus* (*Hydaticus*) *continentalis* J. Balfour-Browne, 1944] **C29**

***Hydaticus* (*Hydaticus*) *seminiger* (De Geer, 1774)**
***Hydaticus* (*Hydaticus*) *transversalis transversalis* (Pontoppidan, 1763) C30**
***Hydaticus* (*Prodaticus*) *grammicus* (Germar, 1827) C31**
[*Hydaticus* (*Prodaticus*) *leander* (P. Rossi, 1790)] **C32**

Hydroporinae Aubé, 1836
Bidessini Sharp, 1882
[*Bidessus coxalis* Sharp, 1882] **C33**
***Bidessus delicatulus* (Schaum, 1844) C34**
***Bidessus grossepunctatus* Vorbringer, 1907**
***Bidessus minutissimus* (Germar, 1823) C35**
[*Bidessus pumilus* (Aubé, 1838)] **C36**
[*Bidessus saucius* (Desbrochers des Loges, 1871)] **C37**
***Bidessus unistriatus* (Goeze, 1777)**
***Hydroglyphus geminus* (Fabricius, 1792)**
***Yola bicarinata bicarinata* (Latreille, 1804)**

Hydroporini Aubé, 1836
Deronectina Galewski, 1994
***Boreonectes alpestris* Dutton & Angus, 2007 C38**
[*Boreonectes inexpectatus* Dutton & Angus, 2007] **C38**
***Boreonectes griseostriatus griseostriatus* (De Geer, 1774) C38**
***Deronectes aubei aubei* (Mulsant, 1843)**
[*Deronectes faimairei* (Leprieur, 1876)] **C39**
***Deronectes latus* (Stephens, 1829)**
***Deronectes moestus inconspectus* (Leprieur, 1876) C40**
[*Deronectes opatrinus* (Germar, 1823)] **C41**
[*Deronectes platynotus platynotus* (Germar, 1834)] **C42**
[*Deronectes semirufus* (Germar, 1844)] **C43**
***Nebrioporus assimilis* (Paykull, 1798) C44**
***Nebrioporus canaliculatus* (Lacordaire, 1835) C45**
[*Nebrioporus depressus* (Fabricius, 1775)] **C46**
***Nebrioporus elegans* (Panzer, 1794)**
[*Oreodytes alpinus* (Paykull, 1798)] **C47**
***Oreodytes davisii davisii* (Curtis, 1831)**
***Oreodytes sanmarkii sanmarkii* (C.R. Sahlberg, 1826)**
***Oreodytes septentrionalis* (Gyllenhal, 1826)**
***Scarodytes halensis* (Fabricius, 1787)**
***Stictotarsus duodecimpustulatus* (Fabricius, 1792)**

Hydroporina Aubé, 1836
***Hydroporus angustatus* Sturm, 1835**
***Hydroporus discretus discretus* Fairmaire & Brisout, 1859**
[*Hydroporus dorsalis* (Fabricius, 1787)] **C48**
[*Hydroporus elongatulus* Sturm, 1835] **C49**
***Hydroporus erythrocephalus* (Linnaeus, 1758)**
***Hydroporus ferrugineus* Stephens, 1829**
***Hydroporus figuratus* (Gyllenhal, 1826) C50**
***Hydroporus foveolatus* Heer, 1840**
[*Hydroporus geniculatus* C.G. Thomson, 1856] **C51**
[*Hydroporus gyllenhalii* Schiødte, 1841] **C52**
***Hydroporus incognitus* Sharp, 1869**
***Hydroporus kraatzii* Schaum, 1867 C53**
***Hydroporus longicornis* Sharp, 1871 C54**
***Hydroporus longulus* Mulsant & Rey, 1861**
***Hydroporus marginatus* (Duftschmid, 1805)**
***Hydroporus melanarius* Sturm, 1835**
***Hydroporus memnonius* Nicolai, 1822**
[*Hydroporus morio* Aubé, 1838] **C55**
***Hydroporus neglectus* Schaum, 1845**
***Hydroporus nigellus* Mannerheim, 1853**
***Hydroporus nigrita* (Fabricius, 1792)**
[*Hydroporus notatus* Sturm, 1835] **C56**
***Hydroporus obscurus* Sturm, 1835**
[*Hydroporus obsoletus* Aubé, 1838] **C57**
***Hydroporus palustris* (Linnaeus, 1760)**
***Hydroporus planus* (Fabricius, 1782)**
***Hydroporus pubescens* (Gyllenhal, 1808)**
***Hydroporus rufifrons* (O.F. Müller, 1776)**
***Hydroporus sabaudus sabaudus* Fauvel, 1865**
***Hydroporus scalesianus* Stephens, 1828 C58**
[*Hydroporus striola* (Gyllenhal, 1826)] **C59**
[*Hydroporus tessellatus* (Drapiez, 1819)] **C60**
***Hydroporus tristis* (Paykull, 1798)**
***Hydroporus umbrosus* (Gyllenhal, 1808)**

Siettitiina Smrž, 1982
***Graptodytes bilineatus* (Sturm, 1835)**
[*Graptodytes flavipes* (Olivier, 1795)] **C61**
***Graptodytes granularis* (Linnaeus, 1767)**
[*Graptodytes ignotus* (Mulsant & Rey, 1861)] **C62**
***Graptodytes pictus* (Fabricius, 1787)**
[*Graptodytes varius* (Aubé, 1838)] **C63**
[*Metaporus meridionalis* (Aubé, 1838)] **C64**
***Porhydrus lineatus* (Fabricius, 1775)**
***Rhithrodytes crux* (Fabricius, 1792) C65**
[*Stictonectes lepidus* (Olivier, 1795)] **C66**

Hydrovatini Sharp, 1880
[*Hydrovatus clypealis* Sharp, 1876] **C67**
***Hydrovatus cuspidatus* (Kunze, 1818)**

Hygrotini Portevin, 1929
***Hygrotus* (*Coelambus*) *confluens* (Fabricius, 1787) C68**
***Hygrotus* (*Coelambus*) *impressopunctatus* (Schaller, 1783)**
[*Hygrotus* (*Coelambus*) *parallelogrammus* (Ahrens, 1812)] **C69**
***Hygrotus* (*Hygrotus*) *decoratus* (Gyllenhal, 1810)**
***Hygrotus* (*Hygrotus*) *inaequalis* (Fabricius, 1777)**
***Hygrotus* (*Hygrotus*) *quinquelineatus* (Zetterstedt, 1828) C70**
***Hygrotus* (*Hygrotus*) *versicolor* (Schaller, 1783)**

Hyphydrini Gistel, 1848
[*Hyphydrus aubei* Ganglbauer, 1891] **C71**
***Hyphydrus ovatus* (Linnaeus, 1760)**

Laccophilinae Gistel, 1848
Laccophilini Gistel, 1848
***Laccophilus hyalinus* (De Geer, 1774)**
***Laccophilus minutus* (Linnaeus, 1758)**
***Laccophilus poecilus* Klug, 1834**

GYRINIDAE Latreille, 1810
Gyrininae Latreille, 1810
Gyrinini Latreille, 1810
[*Aulonogyrus* (*Aulonogyrus*) *striatus* (Fabricius, 1792)] **C72**
***Gyrinus* (*Gyrinulus*) *minutus* Fabricius, 1798**
[*Gyrinus* (*Gyrinus*) *aeratus* Stephens, 1835] **C73**
[*Gyrinus* (*Gyrinus*) *caspius* Ménétriés, 1832] **C74**
[*Gyrinus* (*Gyrinus*) *colymbus* Erichson, 1837] **C75**
[*Gyrinus* (*Gyrinus*) *dejeani* Brullé, 1832] **C76**
***Gyrinus* (*Gyrinus*) *distinctus* Aubé, 1838**
***Gyrinus* (*Gyrinus*) *marinus* Gyllenhal, 1808**
[*Gyrinus* (*Gyrinus*) *natator* (Linnaeus, 1758)] **C77**
[*Gyrinus* (*Gyrinus*) *opacus* C.R. Sahlberg, 1819] **C78**
***Gyrinus* (*Gyrinus*) *paykulli* G. Ochs, 1927**
***Gyrinus* (*Gyrinus*) *substriatus* Stephens, 1828**
***Gyrinus* (*Gyrinus*) *suffriani* W. Scriba, 1855**
[*Gyrinus* (*Gyrinus*) *urinator* Illiger, 1807] **C79**

Orectochilini Régimbart, 1882
***Orectochilus villosus villosus* (O.F. Müller, 1776)**

HALIPLIDAE Aubé, 1836
***Brychius elevatus* (Panzer, 1793)**
[*Brychius glabratus* (A. Villa & G.B. Villa, 1835)] **C80**
***Haliplus* (*Haliplidius*) *confinis* Stephens, 1828**
***Haliplus* (*Haliplidius*) *obliquus* (Fabricius, 1787)**
[*Haliplus* (*Haliplus*) *apicalis* C.G. Thomson, 1868] **C81**
***Haliplus* (*Haliplus*) *fluviatilis* Aubé, 1836**
[*Haliplus* (*Haliplus*) *fulvicollis* Erichson, 1837] **C82**
***Haliplus* (*Haliplus*) *heydeni* Wehncke, 1875**
***Haliplus* (*Haliplus*) *immaculatus* Gerhardt, 1877 C83**
[*Haliplus* (*Haliplus*) *lineolatus* Mannerheim, 1844] **C84**
***Haliplus* (*Haliplus*) *ruficollis* (De Geer, 1774)**
***Haliplus* (*Haliplus*) *sibiricus* Motschulsky, 1860**
***Haliplus* (*Liaphlus*) *flavicollis* Sturm, 1834**
***Haliplus* (*Liaphlus*) *fulvus* (Fabricius, 1801) C85**
***Haliplus* (*Liaphlus*) *laminatus* (Schaller, 1783)**
***Haliplus* (*Liaphlus*) *mucronatus* Stephens, 1828 C86**
***Haliplus* (*Liaphlus*) *variegatus* Sturm, 1834**
***Haliplus* (*Neohaliplus*) *lineatocollis* (Marsham, 1802)**
***Peltodytes caesus* (Duftschmid, 1805)**
***Peltodytes rotundatus* (Aubé, 1836) C87**

HYGROBIIDAE Régimbart, 1879
***Hygrobia hermanni* (Fabricius, 1775) C88**

NOTERIDAE C.G. Thomson, 1860
Noterinae C.G. Thomson, 1860
Noterini C.G. Thomson, 1860
***Noterus clavicornis* (De Geer, 1774)**
***Noterus crassicornis* (O. F. Müller, 1776)**

Commented species

C1) [*Agabus* (*Acatodes*) *arcticus arcticus* (Paykull, 1798)]

Examined material. [4,6,8]1 ex., Luzern, Birregg, XI.1927, leg. Huber A., NMLU.

Comment. Of the three subspecies of *Agabus arcticus*, the nominal subspecies is distributed in the northern Palaearctic (Hájek 2017a). Its presence in Switzerland seems unlikely since its European distribution is limited to Finland, Great Britain, Ireland, Norway, Russia (North European Territory), and Sweden. The single specimen found in the collections consulted was probably mislabeled.

C2) [*Agabus* (*Acatodes*) *thomsoni* (J.R. Sahlberg, 1871)]

Published data. [1,8]Am Roseg im Engadin by von Heyden L. (Stierlin 1883).

Comment. The only occurrence of this species in Switzerland is a very old and unverifiable literature mention. The presence of this species in Switzerland is highly unlikely, as it is only known in Europe from Finland, Norway, Russia (North European Territory), and Sweden. All citations of *A. thomsoni* in the Alps must be regarded as doubtful (Nilsson 1987).

C3) *Agabus* (*Gaurodytes*) *brunneus* (Fabricius, 1798)

Examined material. [3,4,6,8]1 ex., Alpes, Grisons, leg. and coll. Maerky C., MHNG; [3,4,6]1 ex., Suisse, leg. Sechehaye A., coll. Maerky C., MHNG; [3,4,6,8]1 ex., Alpes, Gemmi, 24.VII, leg. and coll. Maerky C., MHNG; [3,4,6,8]1 ex., Genève, VI., leg. Toumayeff G., MHNG; [3]1 ex., Pfeffers, 30.VII.1903, leg. and coll. Gaud A., MZL; 1 ex., Chiasso, Faloppia, 2.VI.1915, leg. and coll. Fontana P., MSNL; 7 ex., Mendrisio TI, 21.X.2021, leg. and coll. Cosandey V.; 4 ex., Coldrerio TI, 22.V.2023, leg. and coll. Chittaro Y. and Sanchez A.

Published data. [1]Pfeffers by von Heyden L. (Stierlin and Gautard 1867).

Comment. Considered potentially extinct by Carron (2005), this species was recently rediscovered in the extreme south of the canton of Ticino, in the continuity of its distribution in Italy (Franciscolo 1979). Contrary to the information given by Brancucci (1994), *A. brunneus* is present only south of the Alps, and absent from the north. In France, it is common in the south but rarer in the north (Guignot 1947).

C4) [*Agabus* (*Gaurodytes*) *striolatus* (Gyllenhal, 1808)]

Published data. [4,6,8]3 ex., Suisse, coll. Falcoz, MHNL, det. Carron G. (Carron 2005).

Comment. *Agabus striolatus* is mentioned from Switzerland on the basis of three specimens with imprecise labeling, deposited in the Falcoz collection in Lyon, France (Carron 2005). These data are insufficient to include the species in the Swiss fauna, as already suggested by Carron (2005). It is widely distributed in Europe, from northern France (Guignot 1947; Bameul and Queney 2014) and Great Britain to Scandinavia and western Russia (Nilsson and Holmen 1995; Hájek 2017a). *Agabus striolatus* is mentioned by dubious sources in Alsace and is therefore not retained by Callot (2018). The nearest population of this species is located more than 150 km from the Swiss border, in southern Germany (Bleich et al. 2016).

C5) *Ilybius crassus* C.G. Thomson, 1856

Examined material. [3,4,6)]1 ex., Alpes, Savièse, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Schweiz, coll. Staehlin-Bischoff H., NMB; [3,4,6)]2 ex., Suisse, leg. Turretini, coll. Maerky, MHNG; 1 ex., Kt. Bern, Gr. Scheidegg, VIII.1941, leg. and coll. Linder A., ETH; 1 ex., Le Sentier, marais, 7.V.1959, leg. Rehfous M., MHNG; 8 ex., Veveyse, F. David [Fontannaz-David], 20.VII.1959, leg. and coll. Scherler P., NMBE; 2 ex., Kt. Bern, Habkern, VII.1972, leg. and coll. Linder A., ETH; 1 ex., BE, Grindelwald, 16.VII.1979, leg. Anonymous, NMBE; 2 ex., Pontins, st. 15, 1995, leg. Carron G., ETH; 1 ex., Val-de-Ruz NE, 18.VIII.2023, leg. Chittaro Y.; 9 ex., Grindelwald BE, 21.VIII.2023, leg. and coll. Chittaro Y. and Sanchez A.

Published data. 1 ex., in einem kleinen Tümpel auf der grossen Scheidegg, VIII.1941, by Linder A. (Linder 1946).

Comment. This species is mainly found in central and northern Europe, from Switzerland and southern Germany (Köhler and Klausnitzer 1998; Bleich et al. 2016) to Scandinvia. It was not cited from France by Bameul and Queney (2014), nor from Italy by Franciscolo (1979). In Switzerland, *I. crassus* occurs in a few peat bogs in the Jura mountains, as well as in a few high elevation peat bogs in the northern Alps (BE) (Fig. 2).

C6) *Ilybius erichsoni* (Gemminger & Harold, 1868)

Examined material. 2 ex., Aletsch, leg. and coll. Bugnion E., MZL; [3,4,6)]2 ex., Savièse, 5.VIII., leg. and coll. Maerky C., MHNG; 1 ex., GR, Celerina, VIII.1955, leg. Toumayeff G., MHNG; 8 ex., Graubünden, Alp Grüm, 3.VII.1961, leg. and coll. Wolf J.-P., ETH; 3 ex., GR, A. Grüm, VI.1962, leg. Toumayeff G., MHNG; 4 ex., Valais, Lac Ar-Pitetta s/Zinal, 25.VIII.1963, leg. Toumayeff G., MHNG; 2 ex., Moosalp sur Bürchen, 11.VII.1974, leg. and coll. Scherler P., NMBE; 1 ex., Bonigersee, 17.IX.1993, leg. Rotzer A., MZL; 2 ex., Moosalp, Postautohalt, 31.V.1994, leg. Rotzer A., MZL; 1 ex., [Seelein, Bettmeralp], 2.VIII.1996, leg. Carron G., LEBA; 3 ex., Anniviers VS, 30.VI.2001, leg. Carron G., ETH; 1 ex., Törbel VS, 1.VII.2001, leg. Carron G., ETH; 12 ex., Bürchen VS, 13.VII.2004, leg. Carron G., ETH; 45 ex., Bürchen VS, 12.VI.2005, 16.VI.2005, leg. Carron G., ETH; 4 ex., Bürchen VS, 2.VII.2021, leg. and coll. Chittaro Y. and Cosandey V.; 3 ex., 2.VII.2021, Törbel VS, leg. and coll. Cosandey V.; 7 ex., Anniviers VS, 19.VIII.2021, leg. and coll. Cosandey V.; 3 ex., Törbel VS, 8.IX.2023, leg. and coll. Chittaro Y. and Sanchez A.

Published data. 1 ♀, Toerbel, Breitmattsee, 2047m by Rotzer A. (recorded as *Agabus nigroaeneus*) (Rotzer 1989); Wallis, Goppisberg, Scheene Bodu, 20.VII.1987 and Wallis, Törbel, Breitmattsee, 7.VII.1987 by Rotzer A. (Brancucci and Rotzer 1989).

Comment. In Switzerland, this species is present only in the Alps, where it is extremely localized (Fig. 2). Targeted surveys of Alpine ponds have found it in abundance at historic sites, but no new sites could be found. Potentially, *I. erichsoni* may be outcompeted by *A. bipustulatus*, as these two species have never been found together in Switzerland. *Ilybius erichsoni* has a Holarctic distribution, being present in the Palaearctic region from Scandinavia to Japan, but also in central Europe, Italy, and Switzerland (Nilsson and Holmen 1995). Although it has never been reported in France (Bameul and Queney 2014), it could be present there.

C7) [*Ilybius meridionalis* Aubé, 1837]

Examined material. [3,4,6,8)]2 ex., Tessin, leg. Frey-Gessner E., coll. Maerky C., MHNG.

Published data. [3,4,6,8)]2 ex., Tessin by Frey-Gessner E., MHNG (Carron 2005).

Comment. In Europe, this species occurs in France (Guignot 1947; Bameul and Queney 2014) and Italy (Franciscolo 1979) in the western Mediterranean region (Guignot 1947). As already announced by Carron (2005), *I. meridionalis* is absent from Switzerland; the only Swiss occurrence comes from the problematic collection of C. Maerky (Monnerat et al. 2015) and should not be considered.

C8) [*Ilybius montanus* (Stephens, 1828)]

Examined material. [3,4,6)]1 ex., Alpes, Louèche, 2.VII., leg. and coll. Maerky C., MHNG.

Comment. Although this species is widely distributed in Europe and North Africa, it is not considered part of the Swiss fauna. Indeed, the only Swiss occurrence comes from the problematic collection of C. Maerky (Monnerat et al. 2015). This species remains potential for Switzerland as it has been found in the neighboring regions of Alsace and Bas-Rhin (Callot 1990, 2018) as well as in Baden in southern Germany (Köhler 2011).

C9) *Ilybius neglectus* (Erichson, 1837)

Examined material. 1 ex., Schaffhausen, Schaaren, leg. Böschenstein A., NMSH; 1 ex., Stein a. Rhein, leg. Böschenstein A., NMSH; 1 ex., Nürensdorf, 28.VI.1855, coll. Dietrich K., ETH; 1 ex., Suisse, Vaud, Boussens, 1956, leg. Barbey, MZL; 1 ex., Mollens VD, 2.VII.2016, leg. and coll. Chittaro Y.; 1 ex., Mollens VD, 8.IV.2017, leg. and coll. Cosandey V.; 1 ex., Mollens VD, 31.V.2018, leg. and coll. Chittaro Y.; 2 ex., Ballens VD, 3.VIII.2021, leg. and coll. Chittaro Y.; 2 ex., Rümlang ZH, 23.V.2022, leg. and coll. Birnstiel E.; 4 ex., Rümlang ZH, 1.VI.2022, leg. and coll. Birnstiel E.; 1 ex., Mollens VD, 18.IV.2023, 27.V.2023, leg. and coll. Chittaro Y.; 2 ex., Thal SG, 1.V.2023, leg. and coll. Sanchez A.; 1 ex., Schaffhausen SH, 3.V.2023, leg. and coll. Sanchez A.

Published data. Marais de Kloten, 13.IX.1967, 20.IX.1967, 29.VII.1970 by Gassmann M., det. Schaeflein H. (Gassmann 1974).

Comment. This species has a northern distribution and reaches Switzerland at its extreme southern limit, as already indicated by Carron (2005). It is now known from

a few localities in northeastern Switzerland and two isolated localities in the canton of Vaud. Sporadically present in the northern half of France (Bameul and Queney 2004), it is known from Alsace (Callot 1990, 2018), Vorarlberg (Brandstetter and Kapp 1995), and southern Germany (Köhler and Klausnitzer 1998; Köhler 2000; Bleich et al. 2016). Additional populations are likely to be found in northern Switzerland.

C10) [*Ilybius similis* C.G. Thomson, 1856]

Published data. [1,8)]CH [Switzerland] (Brancucci 1994).

Comment. This species is mainly found in northern Europe and is not known from regions neighbouring Switzerland; in France, it is only mentioned in Finistère, Vienne, and Haute-Vienne (Bameul and Queney 2014) and only a few old records (before 1950) indicate it occurs in southern Germany, in the Land Bayern (Köhler and Klausnitzer 1998). *Ilybius similis* does not occur in Switzerland; it is only mentioned in the Swiss red list (Brancucci 1994) and no specimen deposited in Swiss natural history collections support its presence in the country.

C11) *Ilybius subaeneus* Erichson, 1837

Examined material. 1 ex., Batiaz, coll. Cerutti N., MHNF; 1 ex., Bern, leg. and coll. Burghold W., NMBE; [3,4,6)]1 ex., Suisse, Bienne, leg. Fries A., coll. Maerky C., MHNG; 1 ex., Martig. [Martigny], leg. Favre E., coll. Moritz P., MHNS ; [3,4,6)]1 ex., Kt. Wallis, leg. Täschler M., coll. Linder A., ETH; 1 ex., S. Léon. [St-Léonard], leg. and coll. Berhaut J., MHNS; 1 ex., Wallis, leg. Anonymous, ETH; 1 ex., Kt. Wallis, Siders, VI.1939, leg. and coll. Linder A., ETH ; 1 ex., Pte à la Bise, 20.IX.1946, leg. Simonet J., MHNG ; 1 ex., Suisse, Vaud, La Chaux, 27.V.1951, leg. Besuchet C., MZL; 1 ex., Hermance, Lac Léman, 25.V.1958, leg. Rehfous M., MHNG.

Published data. [1)]Katzensee (Heer 1841) ; [1)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867) ; [1)]Lugano by Forel A.-H. (Stierlin 1883) ; [1)]Châtelard and [2)]Trient by Favre E. (Favre 1890) ; [1)]St. Gallen by Müller-Rutz J. (Müller 1904); [2)]Thal, b. Fuchsloch, VII.1957 by Hugentobler H. (Hugentobler 1966) ; [1)]Grangettes, 1996, 1997 (Naceur 1997).

Comment. A few sparse occurrences of *I. subaeneus* exist in Switzerland, mainly in the canton of Valais and in the Lake Geneva region. The specimen cited from Trient by Favre (1890) was in fact an *I. fenestratus*, while the one from Thal cited by Hugentobler (1966) was an *I. ater*. *Ilybius subaeneus* is a Holarctic species known from southern Germany (Köhler and Klausnitzer 1998), near Basel (Bleich et al. 2016), and from northern France (Guignot 1947; Bameul and Queney 2014). Given these distribution data, observations in northern Switzerland cannot be ruled out.

C12) [*Ilybius subtilis* Erichson, 1837]

Published data. [1)]Aigle (Heer 1841); [1)]au-dessus du glacier d'Aletsch by Martin C. (Favre 1890).

Comment. In Switzerland, only two occurrences in the older literature exist, which is insufficient to include this species in the Swiss fauna. As Carron (2005) already pointed out, depending on the localities, it is very likely that the specimen cited by Favre (1890) was *Ilybius erichsoni* and that cited by Heer (1841) was *Agabus melanarius*. *Ilybius subtilis* is known from Alsace (Callot 1990, 2018), where it colonises ponds in dark forests, and from southern Germany (Köhler and Klausnitzer 1998), where the nearest localities are more than 150 km from the Swiss border (Bleich et al. 2016). The presence of this northern European and Siberian species in Switzerland is possible but needs to be confirmed.

C13) [*Colymbetes striatus* (Linnaeus, 1758)]

Comment. As Carron (2005) mentioned, there was one misidentified specimen of *Colymbetes striatus* (Peney GE, 1895, leg. Tournier H.) in the collections of the MHNG, which was in fact a *C. fuscus*. Without any concrete evidence, this species is therefore not considered indigenous in Switzerland, although it is widespread throughout the Palaearctic region.

C14) [*Meladema coriacea* Laporte, 1835]

Examined material. [3,4,6,8)]1 ex., Sierne, 18.V., leg. Anonymous, coll. Maerky C., MHNG.

Comment. The only specimen of *M. coriacea* labelled as Swiss comes from the problematic collection of Charles Maerky and must be regarded as a doubtful record. Consequently, this species is not included in the Swiss list. According to Guignot (1947), it occurs in the Mediterranean area, including its islands, Portugal, and North Africa. In France, this species is present in the Mediterranean area and in Corsica (Bameul and Queney 2014). In Italy, its nearest populations are located more than 200 km from the Swiss border (Franciscolo 1979).

C15) *Rhantus* (*Rhantus*) *bistriatus* (Bergsträsser, 1777)

Examined material. [3,4,6)]2 ex., Bern, leg. and coll. Burghold W., NMBE; [3,4,6)]1 ex., Schaffh., coll. Stierlin G., ETH; [3,4,6)]1 ex., Schweiz, leg. Staehlin-Bischoff, NMB; 1 ex., Valais, leg. Favre E., MHNG; [3,4,6)]1 ex., Suisse, Bienne, 11.VI., leg. and coll. Maerky C., MHNG; 1 ex., Genève, Veyrier, 25.VII., leg. Huber A., NMLU; 1 ex., Martigny, 7.VI.1886, leg. Gaud A., MZL; 1 ex., Lac Léman, 1.VII.1925, leg. Huber A., NMLU; 1 ex., Petite Grave, 4.V.1957, leg. Rehfous M., MHNG.

Published data. [1)]Bern by Heer O. (Stierlin and Gautard 1867) ; [1)]mares entre le Guercet et le pont vers l'Eglise de Fully and [1)]Praz-Pourris, près Vétroz by Favre E. (Favre 1890) ; [3,4,6)]Schaffhausen by Stierlin G., Martigny VS by Gaud A. (MZL) and Region Genf (Carron 2005).

Comment. As already mentioned by Carron (2005), this species is only represented in collections by historical specimens, the last record dating from 1957. Although considered highly threatened by Brancucci (1994), it is

more likely that this species is now extinct in Switzerland. *Rhantus bistriatus* is widely distributed in the Palaearctic region; it is present in the northern half and central France (Bameul and Queney 2014) but absent from Alsace (Callot 2018), and uncommon in southern Germany (Köhler and Klausnitzer 1998; Bleich et al. 2016).

C16) [*Rhantus* (*Rhantus*) *consputus* (Sturm, 1834)]

Examined material. [3,4,6)]2 ex., Schaffh., coll. Stierlin G., ETH; [3,4,6)]1 ex., Suisse, Argovie, leg. and coll. Maerky C., MHNG.

Published data. [1)]Bern by Perty M. (Heer 1837); [3,4,6)] Schaffhausen by Stierlin G. (Stierlin and Gautard 1867); [1)]Valais by Fauvel C.A.A. (Guignot 1931–1933); [1)]CH [Switzerland] (Brancucci 1994).

Comment. This species has a west-palaearctic distribution. It is not considered part of the Swiss fauna because the only existing specimen comes from the problematic collection of C. Maerky, while the literature occurrences cannot be verified. It is mentioned in Alsace (Callot 1990, 2018) in France, in Vorarlberg near Bregenz (Brandstetter and Kapp 1995) in Austria, and in southern Germany (Köhler and Klausnitzer 1998). Its presence in Switzerland is therefore potential but needs to be confirmed.

C17) *Rhantus* (*Rhantus*) *frontalis* (Marsham, 1802)

Examined material. 1 ex., Genève, Versoix, 10.VI.1924, leg. Huber A., NMLU; 1 ex., Genève, Veyrier, 25.VII.1924, leg. Huber A., NMLU; 2 ex., Lac Léman, 1.VII.1925, leg. Huber A., NMLU; 1 ex., Kt. Bern, Hindelbank, VIII.1969, leg. and coll. Linder A., ETH; 1 ex., CH, BE, Ins, Landw. Schule, 12.VII.1977, leg. Reser-Rezbanyai L., NMLU.

Published data. [1)]Bern by Ougspurger F. P. von and Perty M., [1)]Genf by Chevrier F. and Lasserre H., [1)]im Jura by Mellet L., [1)]Malans by Amstein J. G., [1)]Zürich by Heer O. (Heer 1837); [1)]Pomy (Heer 1841); [1)]Engadin by Meyer-Dür R. L., [1)]Saas by de Bonvouloir H. A. (Stierlin and Gautard 1867); [1)]St. Gallen by Täschler M. (Täschler 1872); [1)]Schaffhausen (Stierlin 1900).

Comment. Although this species is widely distributed in the Palaearctic region, its presence is attested by only a few occurrences in Switzerland, the last record dating from 1977. It has been collected in Liechtenstein near Ruggell (Brandstetter and Kapp 1995) and in southern Germany near Lake Constance (Bleich et al. 2016), so rediscoveries in northern Switzerland are still possible.

C18) *Rhantus* (*Rhantus*) *notaticollis* (Aubé, 1837)

Examined material. 3 ex., Filisur, leg. Wolf E., coll. Wolf J.-P., ETH; 1 ex., Gampel, 24.VI.1926, leg. Bucher P., NMBE; 8 ex., Mittelwallis, 24.VI.1926, leg. Bucher P., NMBE; 2 ex., Domleschg, Cazis, 7.VII.1937, leg. Wolf J.-P., ETH; 1 ex., Domleschg, Rodels, 28.VIII.1938, leg. Wolf J.-P., ETH; 11 ex., Domleschg, Rothenbr., 31.VII.1938, leg. Wolf J.-P., ETH; 7 ex., Domleschg, Roth. [Rothenbrunnen], 3.IX.1938, leg. Wolf J.-P., ETH; 5 ex., Kt. Wallis, Gampel, VI.1942, leg. and coll. Linder A., ETH; 11 ex., Kt. Wallis, Leuk, VI.1942, leg. and coll. Linder A., ETH; 1 ex., Martigny, VI.1945, leg. Linsenmaier W., NMLU; [4,6)]1 ex., Wülflingen, VI.1959, leg. Huber H., NMWI; 1 ex., Bevers, 19.VII.1971, leg. and coll. Scherler P., NMBE.

Published data. Sitten by Isenschmid M. (Stierlin 1883); Saxon, coll. Cerutti N. (Linder 1941); Tümpeln längs der Rhone bei Leuk und Gampel, VI.1942, by Kalt, Pochon H. and Linder A. (Linder 1946).

Comment. This Palaearctic species occurs from central and northern Europe to Japan (Nilsson and Holmen 1995). In Switzerland it has been caught numerous times in Valais and Grisons until 1971. These populations are now extinct, but it is interesting to note that they were the most southernly known. Indeed, *R. notaticollis* is sparsely distributed in France in the Vosges and Isère, where targeted prospections should be carried out (Guignot 1947; Bameul and Queney 2014), and in south Tyrol in Italy (Campo Tures) by old and doubtful occurrences (Franciscolo 1979; Kahlen and Hellrigl 1996). In southern Germany, it is known from the Land of Bayern (Köhler and Klausnitzer 1998) but its nearest populations are located at more than 150 km from the Swiss border (Bleich et al. 2016).

C19) *Rhantus* (*Rhantus*) *suturellus* (Harris, 1828)

Examined material. 3 ex., Einsiedeln, VI., coll. Bugnion E., MZL ; 1 ♂, 24.IV.2020, Les Ponts-de-Martel NE, leg. and coll. Chittaro Y.

Published data. [1)]1 ex., Genève by Tournier (Carron 2005).

Comment. The capture of a male specimen of *Rhantus suturellus* in a peat bog in the canton of Neuchâtel confirms that this species belongs to the Swiss fauna, which was not clear for Carron (2005). This circumboreal species also occurs in Alsace (Callot 1990, 2018) and in southern Germany (Köhler and Klausnitzer 1998; Köhler 2000; Bleich et al. 2016). Carron (2005) also mentions a specimen from Geneva collected by Tournier. However, it could not be found in the MHNG collection, where it should have been deposited.

C20) *Graphoderus austriacus* (Sturm, 1834)

Examined material. 2 ex., Katzensee, leg. Keller, coll. Allenspach V., NMB; 1 ex., Martigny, coll. Cerutti N., MHNF; 8 ex., Martigny, coll. Favre E., HGSB; [3,4,6)]1 ex., Genève, Peney, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, Bienne, 16.VI., leg. and coll. Maerky C., MHNG; 2 ex., Kt. Wallis, Martigny, V.1890, leg. Anonymous, coll. Linder A., ETH; 3 ex., Ch. Fully [Champagne de Fully], 19.V.1890, 20.V.1890, leg. [Favre E.], MHNG; 14 ex., Ch. Fully [Champagne de Fully], 10.VI.1890, leg. Favre E., coll. Cerutti N., Rätzer A., Mathey A., MHNF, MHNG and NMBE; 1 ex., Fully, 19.IV.1901, leg. and coll. Gaud A., MZL; 1 ex., Martigny, 25.IV.1902, leg. and coll. Gaud A., MZL; 1 ex., Basel, VII.1941, leg. and coll. Pochon H., MHNF.

Published data. [1)]Basel by Knecht, [1)]Bern by Meyer-Dür R. L. (Stierlin 1883); Mares entre le Guercet et Fully by Favre E. (Favre 1890); 3 ex., TI, Bolle di Magadino, 1999 by Focarile A. V. (Carron 2005).

Comment. This species is widely distributed in the Palaearctic region. Its range extends from France (mainly in the east and north of the country (Bameul and Queney 2014), but also in Provence according to Guignot (1947)) and northern Italy (Franciscolo 1979) to Sweden and Siberia (Nilsson and Holmen 1995). Although *G. austriacus* was known from a few scattered specimens in Switzerland, it may now be extinct in the country; the last occurrence was in southern Ticino in 1999, and targeted surveys in recent years have failed to find it again. *Graphoderus austriacus* is present in Alsace (Callot 1990, 2018) in France and in southern Germany (Köhler and Klaunsnitzer 1998).

C21) *Graphoderus zonatus zonatus* (Hoppe, 1795)

Examined material. [3,4,6)]1 ex., Genève, Anc. Fossés, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]1 ex., Basel, leg. and coll. Täschler M., MHNG; [3,4,5,6)]1 ex., Basel, leg. Anonymous, NMB; 7 ex., Finge, leg. Bugnion E., MZL; [3,4,6)]1 ex., Genève, Lancy, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, Valais, leg. and coll. Maerky C., MHNG; 2 ex., Ch. Fully [Champagne de Fully], 20.V.1890, leg. Favre E., coll. Cerutti N., MHNF; 1 ex., Aïre, 6.V.1924, leg. Simonet J., MHNG; 6 ex., Kt. Bern, Uettligen, V.1932, V.1933, IV.1934, leg. and coll. Linder A., ETH; 4 ex., Domleschg, Roth., 31.VII.1938, leg. Wolf J.-P., ETH; 1 ex., Domleschg, Roth., 31.IX.1938, leg. Wolf J.-P., ETH; 1 ex., BE, Uttligen, IV.1942, leg. Linder A., coll. Toumayeff G., MHNG; 1 ex., VS, Sierre, VI.1942, leg. Linder A., coll. Allenspach V., NMB; 3 ex., Valais, Gampel, 8.VII.1942, leg. and coll. Pochon H., MHNF; 2 ex., ZH, Niederglatt, VI.1952, leg. Toumayeff G., NMB; 1 ex., VS, Pfynwald, 11.VII.1971, leg. Anonymous, NMBE; 1 ex., VD, Bavois, V.1972, leg. Toumayeff G., MHNG; 1 ex., Finge, Etang entonnoir [Scharzegilu], 1986, leg. Bille R.-P., MHNS; 2 ex., Gouille Salgesch, VIII.1987, leg. Bille R.-P., MHNS; 2 ex., Bonigersee, 29.IV.1993, 17.IX.1993, leg. Rotzer A., MZL; 1 ex., Valais, Moosalp, Breimattsee, 17.VII.1999, leg. Carron G., ETH; 3 ex., Törbel VS, 1.VII.2001, leg. Carron G., ETH; 1 ♂, Cudrefin VD, 16.VI.2014, leg. Vallat A.; 6 ♂, 2 ♀, Törbel VS, 2.VII.2021, leg. and coll. Chittaro Y. and Cosandey V.; 3 ex., Törbel VS, 8.IX.2023, leg. and coll. Chittaro Y. and Sanchez A.; 2 ex., Zeneggen VS, 8.IX.2023, leg. and coll. Chittaro Y. and Sanchez A.

Published data. Schweiz by Fauvel C. A. A. (Stierlin and Gautard 1867); 1 ex., Graubünden, Nähe Ofenpass, Alp da Munt, 2210 m, 27.VI.1984 by Schaeflein H. (Schaeflein 1989).

Comment. This species is widely distributed in the Palaearctic region. In neighboring countries, it is mentioned in southeast Germany (Köhler and Klaunsnitzer 1998; Bleich et al. 2016) and in northern and eastern France, where it reaches Lyon and Evreux (Guignot 1947; Bameul and Queney 2016). In Italy, it is known from a few localities (Franciscolo 1979). While the species was once known from several widely distributed stations in Switzerland, in recent years it has only been found in the canton of Valais and on the shores of Lake Neuchâtel. Targeted surveys of previously known sites have failed to find it, indicating that this species is certainly in danger of extinction in Switzerland.

C22) *Dytiscus circumcinctus* Ahrens, 1811

Examined material. [3,4,6)]1 ex., Aarau, leg. Täschler M., coll. Spälti A., MHNG; 1 ex., Bern, leg. and coll. Burghold W., NMBE; [3,4,6)]1 ex., Genève, Pl. les Ouates, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Schaffhausen, leg. Täschler M., coll. Spälti A., MHNG; [3,4,6)]1 ex., Bienne, 6.VI., leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]2 ex., Colombier, 2.IX., leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]1 ex., Bienne, 6.VI., leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]1 ex., Rouelbeau, 7.X., leg. Anonymous, coll. Maerky C., MHNG; 1 ex., [Dörflingen, Afling], 1848, leg. and coll. Brunner J., NMSH; 1 ex., Pt. Saconnex, IV.1892, leg. Poncy E., MHNG; 1 ex., Pt. Saconnex, V.1892, leg. Anonymous, MHNG; 1 ex., Fribourg, III.1935, leg. Rappo J., MHNG; 2 ex., Prosito, X.1948, leg. Anonymous, MHNS; 1 ex., Stadlersee, 29.IV.1956, leg. and coll. Linsenmaier W., NMLU; 1 ex., ZH, Regensberg, 28.VIII.1957, leg. and coll. Allenspach V., NMB; 4 ex., Les Grangettes, 27.X.1957, leg. and coll. Scherler P., NMBE; 1 ex., Les Grangettes, 24.VIII.1958, leg. and coll. Scherler P., NMBE; 2 ex., Les Grangettes, 5.X.1958, leg. and coll. Scherler P., NMBE; 2 ex., Kt. Waadt, Villeneuve, X.1959, leg. and coll. Linder A., ETH; 2 ex., Les Grangettes, 22.X.1959, leg. and coll. Scherler P., NMBE; 1 ex., VD, Villeneuve, Grangettes, X.1960, leg. Scherler P., MHNG; 2 ex., Les Grangettes, 25.X.1960, leg. and coll. Scherler P., NMBE; 2 ex., Les Grangettes, 25.X.1961, leg. Scherler P., MHNG; 1 ex., Rümlang ZH, 17.V.2022, leg. and coll. Birnstiel E.; 1 ex., Rümlang ZH, 14.VII.2023, leg. and coll. Cosandey V.

Published data. [1)]Colombier im Waadtlande by Bugnion E. and [1)]Katzensee by Heer O. (Heer 1837); [1)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867).

Comment. This Holarctic species is distributed from northern and central Europe to western Russia. In Switzerland, *D. circumcinctus* is very rare, with only scattered records. After more than 50 years without data, it was found again in 2022 and 2023. It is present in southern Germany (Köhler and Klausnitzer 1998). In France, it is recorded from the northern and central regions and in the Alps, but is considered rare and sporadic (Bameul and Queney 2014), as in Italy (Franciscolo 1979).

C23) *Dytiscus circumflexus* Fabricius, 1801

Examined material. [3,4,6)]1 ex., Aarau, leg. Täschler M., coll. Spälti A., MHNG; [3,4,6)]1 ex., Suisse, Bex, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, Bienne, leg.

and coll. Maerky C., MHNG; [3,4,6)]2 ex., Genève, leg. Sechehaye A., coll. Maerky C., MHNG; [3,4,6)]1 ex., Schaffhausen, leg. Täschler M., coll. Spälti A., MHNG; 1 ex., Helv., BL, Oberwil, Ziegelei, 13.III.1954, leg. [Allenspach V.], coll. Allenspach V., MHNG.

Published data. [1)]Lausanne by Mellet L. (Heer 1837); [1)]Buchser-See [Buchs SG] by Rietmann O. (Täschler 1872); [1)]Basel (Stierlin 1900).

Comment. Although this species is widely distributed in Europe, such as in Italy (Franciscolo 1979), France (Bameul and Queney 2014), and Germany (Köhler and Klausnitzer 1998), it appears to be marginal in Switzerland, where it is known only from a single specimen caught in the Basel region in the far north of the country. All other records are linked to problematic collections and should be disregarded. As the species has not been found in Switzerland for 70 years, it is very probably extinct.

C24) *Dytiscus dimidiatus* Bergsträsser, 1777

Examined material. [3,4,6)]2 ex., Suisse, Colombier, leg. and coll. Maerky C., MHNG; 2 ex., Lausanne, leg. and coll. Gaud A., MZL; [3,4,6)]1 ex., Vevey, leg. Täschler M., coll. Spälti A., MHNG; 1 ex., Kt. Waadt, Yverdon, VIII.1939, leg. and coll. Linder A., ETH; [3,4,5,6)]1 ex., Basel, 20.V.1942, leg. Anonymous, NMB; 1 ex., Yverdon, VII.1952, leg. and coll. Sermet A., MZL; 1 ex., Kt., Waadt, Yvonand, IV.1957, leg. and coll. Linder A., ETH; 1 ex., Yvonand, IX.1958, leg. and coll. Sermet A., MZL; 7 ex., Yvonand, 28.IX.1958, leg. and coll. Scherler P., NMBE; 1 ex., Yvonand, 12.X.1958, leg. and coll. Scherler P., NMBE; 1 ex., Vaud, Chabrey, 26.VIII.1962, leg. Aellen V., MHNG; 1 ex., Vaud, Cudrefin, 30.IV.1973, leg. Brancucci M., NMB; 79 ex., Champmartin, 1974, leg. Brancucci M.; 1 ex., Font, 28.IX.1988, leg. Mulhauser B.; 1 ex., Chabrey, 16.VIII.1994, leg. and coll. Scherler P., NMBE; 1 ex., Estavayer, 8.VI.1995, leg. Calame F.; 1 ex., Font, 8.VI.1995, leg. Calame F.; 4 ex., Yvonand VD, 13.VIII.2021, 9.IX.2021, leg. and coll. Chittaro Y. and Cosandey V.

Published data. [1)]Concise am Neuchateller See by Heer O., [1)]Lausanne by Heer O. and [1)]Vevey by de Gautard V. (Stierlin and Gautard 1867); [1)]Buchser-See [Buchs SG] by Rietmann O. (Täschler 1872); [1)]Basel (Stierlin 1900); [Grève de Cudrefin] (Brancucci 1979, 1980); Portalban-Cudrefin, 16.VII.1994 by Scherler P. (Scherler 1995); Grande Cariçaie, 1958–1995 (Mulhauser 1997).

Comment. This Western Palaearctic species is distributed from North Africa to Scandinavia and east to the Caucasus. *Dytiscus dimidiatus* is very rare and localized in Switzerland; almost all the occurrences are concentrated exclusively on the southern shore of Lake Neuchâtel. It appears to be in steep decline there.

C25) [*Dytiscus lapponicus* Gyllenhal, 1808]

Published data. [1)]Simplon ! Par Rausis [« Douteux en Valais » selon Favre E.] (Favre 1890).

Comment. As already mentioned by Carron (2005), *D. lapponicus* is not native to Switzerland and should not have been evaluated in the red list (Brancucci 1994). Two specimens are deposited in the Favre collection (HGSB), which holds almost exclusively insects collected around Martigny and the Grand-Saint-Bernard pass in the canton of Valais. However, the two specimens do not carry a locality label and moreover concern the nominal subspecies, which does not occur in the Alps (see also comment in Carron 2005). The subspecies *disjunctus* Camerano, 1880 is recorded from the Italian and French Alps (Haute-Provence and Hautes-Alpes [Guignot 1947]), the nearest population being 100 km south of the Swiss border. In Italy, it was last collected in 1923 in the Colle della Magdalena Lake before the introduction of trout for sport fishing (Franciscolo 1979). Curiously, Bameul and Queney (2014) list the nominal subspecies for France whereas the southwestern limit of the distribution of *D. lapponicus lapponicus* appears to be in Westfalen, Germany (Köhler and Klausnitzer 1998).

C26) *Dytiscus latissimus* Linnaeus, 1758

Examined material. [3,4,6)]2 ex., Bodensee, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, Bodensee, leg. and coll. Maerky C., MHNG; [3,4,6)]2 ex., Bern, leg. and coll. Burghold W., NMBE; 1 ex., Katzensee, leg. Keller, coll. Nägeli A., NMSO; 1 ex., Katzensee, leg. Schindler, ETH; 1 ex., Katzensee, leg Anonymous, NMAA; [3,4,6)]1 ex., Kt. Genf, leg. Täschler M., coll. Spälti A., MHNG; 2 ex., Zürich, leg. and coll. Linsenmaier W., NMLU; 4 ex., Katzensee, 18.IV.1883, 19.IV.1883, 22.IV.1883, leg. Anonymous, ETH; 1 ex., Katzensee, VIII.1885, leg. and coll. Nägeli A., NMSO; 1 ex., Katzensee, 3.IV.1887, leg. and coll. Nägeli A., NMSO; 1 ex., Zch., Katzensee, 18.VI.1895, leg. Anonymous, ETH; 1 ex., Katzensee, 1902, leg. Keller, coll. Nägeli A., NMSO; 1 ex., Katzensee, VI.1902, leg. De Brenzinger, NMB; 2 ex., Zür., Katz. See, 1910, leg. Keller, coll. Allenspach V., NMB; 2 ex., ZH, Katzensee, 15.V.1910, leg. and coll. Spälti A., MHNG; 2 ex., Kt. Zürich, Zürich, VIII.1928, leg. and coll. Linder A., ETH; 2 ex., Zch., Affoltern, Hänsiried, 19.VIII.1928, leg. and coll. Allenspach V., MHNG and NMB; 1 ex., Zch., Affoltern, Hänsiried, 26.VII.1931, leg. and coll. Allenspach V., MHNG; 1 ex., Zürich, Katzensee, VII.1942, leg. Wolf J.-P., ETH; 1 ex., Zürich, Katzensee, 28.VIII.1942, leg. Wolf J.-P., ETH; 1 ex., Zch., Katzensee, 3.IX.1942, leg. Wolf J.-P., ETH; 2 ex., Katzensee, 20.IX.1942, leg. Wolf J.-P., ETH; 3 ex., Zürich, Affoltern, Hänsiried, Seerosenteich Rosenberger, 7.V.1943, 20.V.1943, leg. and coll. Allenspach V., NMB; 2 ex., vorderer Katzensee, 19.VII.1945, leg. Wolf J.-P., ETH; 1 ex., Hettlingen, 1948, leg. Götz W., NMWI.

Published data. Katzensee (Fuessly 1775); Basel by Frey-Gessner E. and Bodensee by Fuessly J. C. (Heer 1837); Pfäffikersee, in einer Torfgrube, 15.VII.1864 by Dietrich K. (Dietrich 1865); Schaffhausen by Heer O. (Stierlin and Gautard 1867).

Comment. This species is distributed in central and northern Europe and Siberia. It is in steep decline in Europe and has disappeared from entire regions probably due, in part, to its specialized feeding habits, with the larvae relying on a high density of Limnephilidae (Trichoptera) (Scholten et al. 2018). In France, Bameul and Queney (2014) consider it as probably extinct as it has not been caught since the early twentieth century. In Italy, there is only one occurrence dating from the mid-nineteenth century (Lago di Fimon) (Franciscolo 1979). In Switzerland, the few occurrences are all situated around Zürich. The species has not been caught since 1948, although targeted surveys have been carried out (Döös et al. 2017). It is almost certain that this species has become extinct in Switzerland.

C27) [*Eretes sticticus* (Linnaeus, 1767)]

Published data. [1,8)][Schweiz ?] by Heer O. (Bremi-Wolf 1856).

Comment. There is only one literature reference citing this species in Switzerland. However, since this occurrence is not supported by any specimen in the examined collections, the species is not considered indigenous. In France, it is very rare and occurs in the Mediterranean area and on the Atlantic coast (Guignot 1947; Bameul and Queney 1947). In Italy, the nearest populations are located more than 100 km from the Swiss border (Franciscolo 1979).

C28) [*Hydaticus* (*Hydaticus*) *aruspex* Clark, 1864]

Comment. As Carron (2005) indicated, there was an old record of *H. aruspex* in the national database, relating to a specimen conserved at the MZL. However, after checking this collection, no specimen of this species was found, but instead one of *H. continentalis* bearing the same provenance indications (see C29). This record is therefore certainly the result of a previous misidentification. This species is distributed in the north of the Holarctic region. In Germany, *H. aruspex* is absent from the southern half of the country (Bleich et al. 2016). In France, it only occurs in the north (Somme) and west (Girondes, Landes) of the country and is considered a rare post-glacial relict species (Bameul and Queney 2014). In view of these distribution data, the presence of *H. aruspex* in Switzerland is very unlikely.

C29) [*Hydaticus* (*Hydaticus*) *continentalis* J. Balfour-Browne, 1944]

Examined material. [3,4,6,8)]1 ex., Schaffhouse, 1908, leg. Gaud A., MZL.

Published data. [1,8)][Schweiz] by Heer O. (Bremi-Wolf 1856); [1,8)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867); [1,8)]1 ex., Genève and 3 ex., [1,8)]Ch. Des Bois (Chavannes des Bois VD) by Tournier H. (Carron 2005).

Comment. While Carron (2005) retained this species for Switzerland based on a specimen kept at the MZL, we do not consider it to be indigenous here, as the sole specimen belongs to a collection that is not completely reliable. Although widely distributed in the Palaearctic region, *H. continentalis* is not known from areas adjacent to Switzerland; it is absent from the southern half of Germany (Bleich et al. 2016) and is not retained as part of the French Fauna (Bameul and Queney 2014), while a single occurrence is considered reliable in Italy (Franciscolo 1979).

C30) *Hydaticus* (*Hydaticus*) *transversalis transversalis* (Pontoppidan, 1763)

Examined material. [3,4,6)]2 ex., Aarau, leg. Anonymous, NMSH ; [3,4,6)]1 ex., Aarau, leg. Täschler M., coll. Spälti A., MHNG ; 2 ex., Basel, coll. Rätzer A., NMSO; [3,4,6)]1 ex., Bern, leg. and coll. Burghold W., NMBE; [3,4,6)]1 ex., Genf, leg. and coll. Lasserre H., ETH; [3,4,6)]1 ex., Suisse, Louèche, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, Pl. les Ouates, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, Sionnet, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, leg. Poncy E., coll. Maerky C., MHNG; [3,4,6)]1 ex., Wallis, coll. Stierlin G., MHNG; [3,4,6)]1 ex., Rouelbeau, 22.IV, leg. Anonymous, coll. Maerky C. MHNG; [3,4,6)]1 ex., Genève, Sionnet, 16.V, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Peney, 11.V.1886, leg. Anonymous, MHNG; 1 ex., Kt. St.Gallen, Thal, VII.1957, [leg. Hugentobler H.] and coll. Linder A., ETH; 1 ex., Staad, 6.VII.1957, leg. and coll. Spälti A., MHNG; 1 ex., Altenrhein, 11.IV.1966, leg. and coll. Spälti A., MHNG; 12 ex., Kt. St.Gallen, Altenrhein, IV.1969, leg. and coll. Linder A., ETH; 1 ex., Jura, Bonfol, Champ de Manche 1, 4.IX.1998, leg. Carron G., ETH; 6 ex., Thal SG, 1.V.2023, 11.IX.2023, leg. and coll. Chittaro Y., Cosandey V. and Sanchez A.

Comment. This Western Palaearctic species is only known from a few stations in northern Switzerland. In France, recent captures have been limited to Alsace along the Rhine (Callot 1990). This species is known from Vorarlberg in Austria (Brandstetter and Kapp 1995) and from southern Germany (Bleich et al. 2016), close to Switzerland. In Italy, populations are located near the Swiss border (Franciscolo 1979), which means this species could also be present in Ticino.

C31) *Hydaticus* (*Prodaticus*) *grammicus* (Germar, 1827)

Examined material. [3,4,6)]1 ex., Bâle, leg. Anonymous, coll. Jörger J. B., NMB; [3,4,6)]1 ex., Genève, Peney, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, leg. Poncy E., coll. Maerky C., MHNG; [3,4,6)]1 ex., Schaffh., leg. Anonymous, ETH; 1 ex., Fully, 16.V.1890, leg. Favre E., HGSB; 4 ex., Ch. Fully [Champagne de Fully], 19.V.1890, 20.V.1890, leg. Favre E., coll. Cerutti N., HGSB and MHNF; 1 ex., Fully, 20.V.1890, coll. Cerutti N., MHNF; 6 ex., Ch. Fully [Champagne de Fully], 24.V.1890, leg. Favre E., coll. Cerutti N., Mathey A. and Rätzer A., HGSB, MHNF and NMBE; 5 ex., Ch. Fully [Champagne de Fully], 10.VI.1890, leg. Favre E., coll. Cerutti N. and Rätzer A., MHNF and NMBE; 2 ex., Ch.

Fully [Champagne de Fully], 10.VI.1896, leg. Anonymous, MHNG; 2 ex., Fully, 10.IV.1901, coll. Gaud A., MZL; 11 ex., Kt. Wallis, Martigny, VI.1939, leg. and coll. Linder A., ETH; 6 ex., Valais, Martigny, 9.VI.1939, leg. and coll. Pochon H., MHNF; 2 ex., Valais, Gampel, 8.VI.1940, leg. and coll. Pochon H., MHNF; 10 ex., VS, Turtmann, 6.IV.1942, leg. and coll. Allenspach V., NMB; 6 ex., Gampel, VI.1942, leg. Linder A., coll. Linder A. and Steiner H., ETH and NMSO.

Published data. [1)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867); [1)]Aigle by Jaccard H. and Champagnes de Fully, V.1890 by Favre E. (Favre 1890); [1)]Basel (Stierlin 1900); env. De Martigny, coll. Cerutti N. (Linder 1941).

Comment. This species is widespread in the Palaearctic region. In the countries surrounding Switzerland, its presence is only attested by old and sparse occurrences. In France, a single capture in Bas-Rhin in 1951 was recorded (Callot 1990, 2018; Bameul and Queney 2014), in Germany only two old occurrences (before 1950) are considered reliable (Köhler and Klausnitzer 1998), but the species is not established there and not assessed in the latest red list (Spitzenberg et al. 2016), while a single old record attests of the presence of *H. continentalis* in Bregenz, in Austrian Vorarlberg (Schaeflein 1983; Brandstetter and Kapp 1995). In Switzerland, its former presence is attested by numerous specimens collected in several localities in the canton of Valais. The last specimen was caught in 1942 and the species is now probably extinct in Switzerland. Populations in Italy near the canton of Ticino are known (Franciscolo 1979) and a (former) presence of *H. grammicus* in this canton is possible.

C32) [*Hydaticus* (*Prodaticus*) *leander* (P. Rossi, 1790)]

Examined material. [3,4,6,8)]1 ex., Genève, Lancy, 1.V, leg. and coll. Maerky C., MHNG.

Comment. The "Swiss" specimen of *H. leander* comes from the problematic collection of C. Maerky and must be regarded as dubiously labeled. This species does not exist in Switzerland, as already indicated by Carron (2005). This species is present on the Mediterranean coast in France (Bameul and Queney 2014) and in Italy (Franciscolo 1979), where its nearest populations are located more than 200 km from the Swiss border. According to Guignot (1947), this species is distributed in the extreme south of Europe and North, West, and central Africa.

C33) [*Bidessus coxalis* Sharp, 1882]

Published data. [1,3,4,6,8)]2 ex., GE, Meinier, Rouelbeau, coll. Maerky C., MHNG (Carron 2005).

Comment. Carron (2005) mentions two specimens kept at the MHNG, but searches in its collections have failed to find them. In any case, these specimens belonged to the dubious collection of C. Maerky and cannot be considered. This species does not belong to the Swiss fauna. It occurs in North Africa, on the Iberian Peninsula, and in France, where it is found in the southern half and along the coast as far as Brittany and Normandy (Bameul and Queney 2014).

C34) *Bidessus delicatulus* (Schaum, 1844)

Examined material. 1 ex., Genève, leg. Anonymous, MHNG; 1 ex., Peney, leg. Tournier H., ETH; 1 ex., Diepoldsau, 21.VII.1965, leg. Hugentobler H., NMSG; 5 ex., Genève, Chancy, La Laire, 25.VII.1984, 14.VIII.1985, leg. Besuchet C., MHNG; 1 ex., Genève, Verbois, étang, 27.IX.1990, leg. Besuchet C., MHNG; 1 ex., Buchrain LU, 24.IV.2004, leg. Lubini V., coll Birnstiel E.; 6 ex., Chancy GE, 31.V.2021, leg. and coll. Chittaro Y. and Cosandey V.; 2 ex., Chancy GE, 6.V.2022, leg. and coll. Cosandey V.

Published data. [1)]Vevey (Stierlin and Gautard 1867); Diepoldsau, Altenrheinbett b. Kieswerk Sieber, VIII.1965 by Hugentobler H. (Hugentobler 1966); La Laire by Cosandey V. (Cosandey 2023).

Comment. In Switzerland, this species is only known from a few localities scattered at low elevation. Recent targeted surveys in the canton of Geneva found it in a single restricted station, where it was nevertheless abundant (Cosandey 2023). *Bidessus delicatulus* is known in Vorarlberg in Austria (Brandstetter and Kapp 1995) and in southern Germany (Köhler and Klausnitzer 1998; Köhler 2011; Bleich et al. 2016). In France, *B. delicatulus* is rare and localized (Guignot 1947).

C35) *Bidessus minutissimus* (Germar, 1823)

Examined material. [3,4,6)]1 ex., Genève, leg. and coll. Maerky C., MHNG; 2 ex., Genf, leg. Chevrier F., ETH; [3,4,6)]1 ex., ZH, coll. Bugnion E., ETH; 2 ex., Zürichhorn, leg. and coll. Forel A.-H., ETH; 1 ex., Genthod, VI., leg. Anonymous, NMBE; 5 ex., Zürich, 23.V.1868, coll. Bugnion E., MZL; 2 ex., Riva S. V., riva del lago [Riva San Vitale], 8.V.1914, leg. and coll. Fontana P., MSNL; 2 ex., Zürich Umg., Limmat, 23.V.1941, leg. Wolf J.-P., ETH; 1 ex., Moulin de Vert, 3.VIII.1984, leg. and coll. Scherler P., NMBE; 1 ex., Verbois, 14.VIII.1986, leg. and coll. Scherler P., NMBE; 5 ex., Genève, Verbois, 27.IX.1990, leg. Besuchet C., MHNG; 9 ex., Genève, Moulin de Vert, 30.V.1991, leg. Besuchet C., MHNG; 1 ex., XI.2002, Chancy GE, leg. Lavigne S., det. Carron G., MHNG; 7 ex., Arbon TG, 10.VIII.2004, leg. HYDRA-Institut für angewandte Hydrobiologie; 5 ex., Gordola TI, 19.V.2007, leg. and coll. Geiser M., NMBE; 1 ex., Chancy GE, 19.IV.2019, leg. and coll. Cosandey V.; 6 ex., Chancy GE, 31.V.2021, leg. and coll. Chittaro Y.; 8 ex., Chancy GE, 6.V.2022, leg. and coll. Cosandey V.

Published data. Genf (Heer 1841); Zürich am Horn by Kubli H. (Stierlin and Gautard 1867); Riva S. Vitale, V.1914 by Fontana P. (Fontana 1922); La Laire by Cosandey V. (Cosandey 2023).

Comment. This rare species has been caught mainly around Geneva but also in the canton of Ticino and in northern Switzerland. The ecological requirements of

Bidessus minutissimus could explain its rarity; it could be linked to underground flows of well-oxygenated water (Carron and Castella 2007).

C36) [*Bidessus pumilus* (Aubé, 1838)]

Published data. [2,8]2 ex., Locarno, IV.1934 by Toumayeff G. (Linder 1953).

Comment. This species colonizes the western part of the Mediterranean region, reaching Portugal and North Africa (Guignot 1947). In France, it is known only from Languedoc, Roussillon, Provence, and Corsica (Bameul and Queney 2014). In Italy, it is almost totally absent from the northern third of the country (Franciscolo 1979). This species does not exist in Switzerland; the two specimens cited in the literature were in fact a *Bidessus unistriatus* and a *Hydroglyphus geminus*, as mentioned by Carron (2005).

C37) [*Bidessus saucius* (Desbrochers des Loges, 1871)]

Examined material. [3,4,6,8]2 ex., Genève, Rouelbeau, 22.IV., leg. and coll. Maerky C., MHNG.

Published data. [3,4,6,8]2 ex., Rouelbeau, Meinier GE, coll. Maerky C., MHNG (Carron 2005).

Comment. The specimens examined belong to the problematic collection of C. Maerky, which cannot be considered reliable. *Bidessus saucius* does not exist in Switzerland. This species is known only from Corsica in France (Bameul and Queney 2014) and from Italy, where it is absent from the northern third of the country, the nearest occurrences being near Genoa (Franciscolo 1979).

C38) *Boreonectes alpestris* Dutton & Angus, 2007, [*Boreonectes inexpectatus* Dutton & Angus, 2007], and *Boreonectes griseostriatus* (DeGeer, 1774)

Published data. *B. alpestris* – 3 ♂, 2 ♀, Switzerland, Ticino, Above Medeglia, VIII.1994 by Focarile A. (Dutton and Angus 2007); *B. inexpectatus* – [1,4,5,6,7,8]Suisse (Bameul and Queney 2014); *B. griseostriatus* – 1 ♂, Switzerland, Valais, Lake by the Illsee (Angus 2010).

Comment. The very heterogenous genus *Stictotarsus* Zimmermann, 1919 has been shown to be polyphyletic (Ribera 2003) and was problematic for coleopterists (Angus 2010). To solve part of this problem, *Boreonectes* Angus, 2010 was established (Angus 2010), making it possible to exclude certain species from the genus *Stictotarsus*. Dutton and Angus (2007) showed that multiple karyotypic lineages were included under the nomen *griseostriatus*. They described these lineages as new species. Thus, the presence of two species of *Boreonectes* is attested for Switzerland: *B. alpestris* (Ticino) and *B. griseostriatus* (Valais) (Angus 2010), whereas the citation of *B. inexpectatus* in Switzerland (Bameul and Queney 2014) is most probably erroneous, the latter being known only from its type locality in France (Dutton and Angus 2007; Angus 2010). However, as the authors pointed out, most *Boreonectes* are visually impossible to identify without examining karyotypes, so we have decided, from a practical point of view, to assign all the Swiss data to a "*griseostriatus* aggregate".

C39) [*Deronectes fairmairei* (Leprieur, 1876)]

Published data. [3,4,6,7,8]7 ex., Chanzy [W of Lake Geneva, Switzerland], 1890 by de Vauloger, ex coll. R. R. Oberthür, ex Wehncke" (MNHN – Muséum National d'Histoire Naturelle, Paris, France) and [3,4,6,7,8]1 ex., Suisse, Dôle, VII.55 (IRSN – Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium) (Fery and Brancucci 1997).

Comment. This species has a western Mediterranean distribution. It is found in North Africa and along coastal regions from Portugal to western Italy (Liguria – Franciscolo 1979). In France, *D. fairmairei* is only known from the south of the country (Bameul and Queney 2014). The specimens bearing a "Swiss" label have already been considered doubtful by Fery and Brancucci (1997).

C40) *Deronectes moestus inconspectus* (Leprieur, 1876)

Examined material. 2 ex., Mulini di Morbio inferiore, roggia del Breggia, Castello, IV.1911, leg. and coll. Fontana P., MSNL; 1 ex., Chiasso, laghetto [Brogeda], 1914, leg. and coll. Fontana P., MSNL; 2 ex., Genève, Certoux, III.1949, leg. Toumayeff G., MHNG; 5 ex., Russin, Allondon, 6.VIII.1955, 13.VIII.1955, 27.V.1956, leg. Rehfous M., MHNG; 2 ex., Malval, Allondon, 27.VIII.1955, 19.VIII.1956, leg. Rehfous M., MHNG; 1 ex., Suisse, Tessin, s/Sagno, ruisseau, 18.IX.1955, leg. Besuchet C., MZL; 25 ex., Chancy, La Laire, 1.VIII.1956, 5.VIII.1956, 8.VIII.1956, 12.VIII.1956, 6.IX.1956, 27.VII.1957, 3.V.1958, 19.III.1960, leg. Rehfous M., MHNG; 3 ex., Chancy, La Laire, 12.VIII.1956, leg. Rehfous M., coll. Allenspach V., NMB; 2 ex., Genève, Chancy, V.1956, leg. Toumayeff G., MHNG; 3 ex., Genève, Chancy, La Laire, 14.VIII.1985, leg. Besuchet C., MHNG; 1 ex., Veyron VD, [II.2004], leg. Carron G., ETH; 2 ex., Dardagny GE, VIII.2005, leg. Anonymous, ETH; 6 ex., Dardagny GE, 24.VIII.2021, 9.IX.2021, leg. and coll. Cosandey V.; 5 ex., Dardagny GE, 10.IX.2021, leg. and coll. Chittaro Y.; 2 ♂, 21.X.2021, Mendrisio TI, leg. and coll. Cosandey V.

Published data. Breggia nel canale pei mulini [Morbio Inferiore], IV.1911 by Fontana P. (Fontana 1922); Genève by Sharp D. (Guignot 1931–1933); 1 ex., Genf, coll. Müller Cl., Zoologische Staatsmuseum München (Fery and Brancucci 1997); 1 ex., VD, Veyron bei Montricher, II.2004 by Carron G. (Carron 2005).

Comment. The nominal subspecies is a Corso-Sardinian endemic, while the *inconspectus* subspecies is present in continental Europe from Spain to Greece and Morocco (Fery and Brancucci 1997). It is present in a large part of France, mainly in southern regions (Bameul and Queney 2014). Following the Rhône valley, it reaches the Bugey and, in Switzerland, the Geneva region (Guignot 1947),

where it is known from a few stations. It also exists in southern Ticino, where it is present in continuity with the Italian populations.

C41) [*Deronectes opatrinus* (Germar, 1823)]

Published data. [1,8)]Genève (Guignot 1931–1933); [3,4,6,7,8)]2 ex., Chanzy [Chancy – W of Lake Geneva, Switzerland], 1890 by de Vauloger (MNHN – Muséum national d'Histoire naturelle, Paris, France) (Fery and Brancucci 1997); [1)]4 ex., Genève by Tournier H. (Carron 2005).

Comment. This meridional species is reported from Spain, Portugal, and southwestern France (Fery and Brancucci 1997). In the latter country, *D. opatrinus* reaches as far north as the Haute-Vienne region (Fery and Brancucci 1997; Bameul and Queney 2014). The specimens from the Vauloger collection are labeled with the same locality as *D. fairmairei*. They were examined by Fery and Brancucci (1997), who questioned the validity of these records. The four specimens mentioned by Carron (2005) could not be found in the MHNG collections where they were supposed to be, nor in the MHNP where most of the Tournier collection is deposited. Based on all these elements, *D. opatrinus* is not considered to be part of the Swiss fauna.

C42) [*Deronectes platynotus platynotus* (Germar, 1834)]

Published data. [2)]Dussnang by Eugster A. (Hugentobler 1966).

Comment. Revision of the Hugentobler collection has revealed that the published Swiss occurrence (Hugentobler 1966) relates to a misidentified specimen of *D. aubei* (see also comment C43 for *D. semirufus*). According to Fery and Brancucci (1997), this species has a distribution restricted to central Europe; its range extends from the Netherlands and Belgium to Poland, Serbia, Romania, Bosnia, and Albania. It is not present in France according to Guignot (1947), but Bameul and Queney (2014) mention it from the Ardennes in the northwest of the country. *Deronectes platynotus* is known from Vorarlberg in the Pfänderstock (Brandtstetter and Kapp 1998), some 15 km from Switzerland, and from southern Germany (Köhler and Klaunitzer 1998), near Schaffhausen (Bleich et al. 2016). This species is potentially present in Switzerland, but this needs to be confirmed.

C43) [*Deronectes semirufus* (Germar, 1844)]

Published data. [2)]Dusnang by Eugster A. (Stierlin 1883); [1)]Schwarzwald (? Suisse) (Stierlin 1900); [2)]1 ex., in der Breggia bei Chiasso, V.1943 by Pochon H. and [2)]1 ex., Clarens bei Montreux, V.1944 by v. Peez (Linder 1946).

Comment. *Deronectes semirufus* has recently been rehabilitated as a distinct species from *D. aubei* (Fery and Brancucci 1997). It is known only from Italy, south from the Pô plain, and from France (Fery and Brancucci 1997), where it reaches the Alpes-Maritimes and the Alps of Haute-Provence (Bameul and Queney 2014). Some literature citations of *D. semirufus* from Switzerland refer to *D. aubei* (Stierlin 1883; Linder 1946), as already assumed by Carron (2005). Curiously, the specimen cited from Dusnang (or Dussnang) was published under two nomina, *D. platynotus* and *D. semirufus* (see also comment C42 for *D. platynotus*).

C44) *Nebrioporus assimilis* (Paykull, 1798)

Examined material. [3,4,6)]1 ex., Kt. Basel, leg. Täschler M., coll. Linder A., ETH; [3,4,6)]1 ex., Suisse, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]2 ex., Suisse, Vaud, leg. Sechehaye A., coll. Maerky C., MHNG; [3,4,6)]2 ex., Genève, Veyrier, leg. Sechehaye A., coll. Maerky C., MHNG; [3,4,6)]7 ex., Alpes, Chanrion, 2.VIII, leg. and coll. Maerky C., MHNG; 2 ex., Kt. Bern, Brienz, VI.1909, coll. Linder A., ETH; 12 ex., [Filzbach Talsee] PLOCH GL18, 26.VIII.1998, leg. Carron G. and Oertli B., LEBA and ETH; 10 ex., Glarus Nord GL, 20.VI.2023, leg. and coll. Chittaro Y.

Published data. [1)]Matt,Wiedersteinerloch by Heer O. (Heer 1837); [1)]Ct. Glarus, auf der Mühlebachalp (Heer 1841); [1)]Niederschwerzenbach, 28.VIII.1864 by Frei (Dietrich 1865); [1)]Aarau by Frey-Gessner E., [1)]Basel by Imhoff L., [1)]Engadin by Stierlin G., [1)]Kt. Zürich by Dietrich K., [1)]Lausanne by Bugnion E. and de Gautard V. and [1)]Visp by Venetz I. (Stierlin and Gautard 1867); [1)]Flimser See by Killias E. and [1)]St. Moritzer See by Pfeil (Caflisch 1894).

Comment. This species is distributed in central and northern Europe, as well as in Siberia. In Switzerland, its presence is only attested by a few records in the Alps, in the cantons of Glarus and Bern, where this species reaches the southern limit of its distribution (Nilsson and Holmen 1995). *Nebrioporus assimilis* also occurs in southern Germany (Köhler and Klausnitzer 1998; Bleich et al. 2016), in Alsace (Callot 1990, 2018), in the French Hautes-Vosges (Guignot 1947), and has been cited twice in Vorarlberg in Austria, near the Rhine (Brandstetter and Kapp 1995). Supplementary populations may therefore be found in northern Switzerland.

C45) *Nebrioporus canaliculatus* (Lacordaire, 1835)

Examined material. 1 ex., Genève, Laconnex, VIII.1983, leg. Agroscope - RAC, Changins, MHNG; 1 ex., Genève, Les Baillets, Allondon, 27.IX.1990, leg. Besuchet C., MHNG.

Published data. CH (Carron 2005).

Comment. This species occurs mainly in western and central Europe, from Portugal to Greece, and along the coast as far as the Netherlands and southern Sweden (Nilsson and Holmen 1995). In Switzerland, only two occurrences in the canton of Geneva attest of the marginal presence of this species in the country. In France, it occurs mainly in the southern half of the country (Bameul and Queney 2014) but is also present in Alsace, where it can be abundant in gravel and sand quarries without

vegetation (Callot 1990, 2018). It is also present in southern Germany (Köhler and Klausnitzer 1998), and along the Rhine (Bleich et al. 2016), which means that this species could also be present in northern Switzerland.

C46) [*Nebrioporus depressus* (Fabricius, 1775)]

Published data. [1)]Lac de Joux by Mellet L. (Heer 1837); [1)]Kt. Zürich by Dietrich K., [1)]Luzerner See by Pfeil, [1)]Schaffhausen, in Quellwasser by Stierlin G. and [1)]Wallis by Venetz I. (Stierlin and Gautard 1867); [1)]Dättlikon and Glatthal by Dietrich K. (Stierlin 1883); [2)]Pont de Dorénaz, 29.IV.1890 by Favre E. (Favre 1890); [1)]Caumasee by Jörger J.B. (Linder 1967); [1)]Aare bei Villnachern, 1985 by Sauter W. (Meier et al. 1989); [1)]UR, Seedorf, Ufer des Urner Sees, 11.IX.1990 by Uhlig M. (Uhlig and Uhlig 2006).

Comment. Mainly distributed in northern and eastern Europe, *N. depressus* does not belong to the Swiss fauna (see Caron (2005)); there are only a few citations in the literature, without reference specimens, or they were misidentified specimens, as in the case of the record of Favre (1890), which turned out to be a *N. elegans*.

C47) [*Oreodytes alpinus* (Paykull, 1798)]

Examined material. [3,4,6,8)]2 ex., Suisse, leg. Anonymous, coll. Maerky C., MHNG.

Published data. [1)]in der Töss am Fuss der Straleck by Heer O. (Dietrich 1865); [1)]Engadin by Heer O., [1)]Genf by Heer O., [1)]La London by de Bonvouloir H. A., [1)]Lausanne am Seeufer by Bugnion E., [1)]Rheinwald by Heer O., [1)]Schaffhausen by Heer O. and [1)]Schwarzsee bei Zermatt by de Gautard V. (Stierlin and Gautard 1867); [1)]1 ex., Saint-Bernard and [1)]2 ex., Suisse, coll. Maerky C., MHNG (Carron 2005).

Comment. *Oreodytes alpinus* is distributed in the northern Palaearctic (in Scotland, Fennoscandia, and northwest Siberia (Nilsson and Holmen 1995)) but is not present in the Alps. A few specimens are labeled as Swiss but, as they originate from the collection of C. Maerky, they must be regarded as doubtful. The occurrences in the literature probably concern *O. davisii*.

C48) [*Hydroporus dorsalis* (Fabricius, 1787)]

Published data. [2)]Basel by Bischoff-Ehinger A. and [1)] Vevey by de Gautard V. (Stierlin and Gautard 1867); [2)] Frauenfeld, Osterhalden [Osterhalde], VIII.1954 by Hugentobler H. (Hugentobler 1966); [1)]Grangettes, 1900 (Naceur 1997).

Comment. Recently, Bergsten et al. (2012) rehabilitated *Hydroporus figuratus*, a former synonym of *H. dorsalis*. Examination of all the "*Hydroporus dorsalis*" contained in Swiss collections revealed that all were in fact *H. figuratus*. Further, all the data in the literature probably also refer to *H. figuratus* (see also comment C50 for *H. figuratus*). As far as we know, *H. dorsalis* does not occur in Switzerland. However, its range is vast and could include Switzerland; *H. dorsalis* is potentially a resident.

C49) [*Hydroporus elongatulus* Sturm, 1835]

Examined material. [3,4,6)]1 ex., Genève, Bellerive, 3.VI., leg. and coll. Maerky C., MHNG.

Published data. [1)][Schweiz] by Stierlin G. (Bremi-Wolf 1856); [1)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867).

Comment. This species is distributed from central and northern Europe to Siberia (Guignot 1947). It is rare throughout its range (Guignot 1947; Nilsson and Holmen 1995; Bameul and Queney 2014). *Hydroporus elongatulus* is not included in the Swiss list because all the specimens labelled as Swiss come from Charles Maerky's problematic collection. However, its presence in Switzerland remains possible as it occurs in southern Germany in Bavaria and Württemberg (Köhler and Klausnitzer 1998), with its nearest populations located at about 20 km from Lake Constance (Bleich et al. 2016).

C50) *Hydroporus figuratus* (Gyllenhal, 1826)

Examined material. [3,4,6)]2 ex., Basel, leg. Anonymous, NMB; [3,4,6)]4 ex., Peney, 16.VI., leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]1 ex., Schweiz, leg. and coll. Staehlin-Bischoff, NMB; [3,4,6)]2 ex., Suisse, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]1 ex., Villeneuve, 20.VI., leg. Anonymous, coll. Maerky C., MHNG; 2 ex., Stein a. Rhein [Stein am Rhein], Staffel, 19.III.1879, 24.IV.1884, leg. Böschenstein A., NMSH; [3,4,6)]1 ex., Wallis, 1903, leg. de Brenzinger, MHNG; 1 ex., Vevey, 10.V.1904, leg. and coll. Gaud A., MZL; 1 ex., Frauenfeld, Osterhalden, Winkel (Riet), 27.VIII.1954, leg. and coll. Hugentobler H., NMTG; 12 ex., Kt. Thurgau, Frauenfeld, VIII.1954, VII.1955, VIII.1955, leg. and coll. Linder A., ETH; 7 ex., TG, Frauenfeld, IX.1956, leg. and coll. Linder A., ETH, MHNG and NMB; 1 ex., Frauenfeld, Osterhalden, 17.IX.1956, leg. and coll. Hugentobler H., NMTG; 11 ex., Kt. Thurgau, Frauenfeld, VI.1967, leg. Linder A., coll. Allenspach V., Linder A., coll. Scherler P., MHNG, NMB and NMBE; 3 ex., Frauenfeld, leg. Linder A., NMBE; 5 ex., Frauenfeld, 15.IV.1969, leg. Linder A., coll. Kiener S. and Spälti A., MHNG; 5 ex., Kt. Thurgau, Frauenfeld, VIII.1970, leg. Linder A., coll. Ochs W. and coll. Kiener S., MHNG and NMBE; 5 ex., Schaffhausen SH, 3.V.2023, 12.IX.2023, leg. and coll. Chittaro Y., Cosandey V. and Sanchez A.

Comment. Recently, Bergsten et al. (2012) removed *Hydroporus figuratus* from the list of synonyms of *H. dorsalis*, considering both species valid. This species is widely distributed in the Western Palearctic but is absent from the Balcanic, Iberic, and Italian peninsulas (Bergsten et al. 2012). In Switzerland, the species is very rare and almost all records are from the northeast of the country. After more than 50 years without any occurrence, it was rediscovered in 2023 in a small forest marsh in the canton of Schaffhausen.

C51) [*Hydroporus geniculatus* C.G. Thomson, 1856]

Published data. [1)]Forêt d'Aletsch by Bugnion E. (Favre 1890).

Comment. *Hydroporus geniculatus* is a Holarctic species reaching Denmark in the south of its distribution (Nilsson and Holmen 1995). Carron (2005) indicated that the specimens cited by Favre (1890) were misidentified *H. nigellus*; unfortunately, these specimens were not found in the MZL collection where they are supposed to be deposited.

C52) [*Hydroporus gyllenhalii* Schiødte, 1841]

Examined material. [3,4,6)]1 ex., Basel, leg. Anonymous, coll. Linder A., ETH.

Published data. [1)]Engadin by von Heyden L. (Stierlin and Gautard 1867); [1)]Basel by Knecht (Stierlin 1883); [3,4,6)]2 ex., Basel by Linder, ETH (Carron 2005).

Comment. Only one specimen with imprecise labeling (no date and imprecise locality) is known from Switzerland. This specimen is deposited in the Linder collection but was not collected by him. The other citations in the literature are very old and unverifiable. Like Carron (2005), we consider this information as insufficient to include *H. gyllenhalii* in the Swiss fauna. This species is distributed in central and northern Europe. It is locally abundant in Alsace (Callot 1990, 2018) and is known a few kilometers from the Swiss border in the Vorarlberg in Austria (Brandstetter and Kapp 1995). It is also present in southern Germany (Köhler and Klausnitzer 1998), close to the Swiss border (Bleich et al. 2016). The presence of this species in Switzerland remains therefore possible but needs to be confirmed.

C53) *Hydroporus kraatzii* Schaum, 1867

Examined material. 3 ex., Scarl, 6.VIII.1918, leg. and coll. Handschin E., BNM; 2 ex., Suisse, Valais, Praz de Fort, 9.VI.1976, 26.VII.1989, leg. Besuchet C., MHNG; 1 ex., Le Mazé, Les Mouilles, 29.V.1977, leg. Matthey W., MHNN; 1 ex., Helv., Kt. Bern, Napf, 9.V.1979, leg. Kiener S., MHNG; 1 ex., Bedretto TI, 4.VIII.2004, leg. Carron G., ETH; 14 ex., Bedretto TI, 16.VII.2005, leg. Carron G., ETH; 1 ex., Saanen BE, 29.VII.2017, leg. and coll. Cosandey V.; 1 ♀, 2 ♂, Diemtigen BE, 1.VII.2021, 9.IX.2021, leg. Wüthrich R.; 5 ex., Trient VS, 29.VI.2022, leg. and coll. Cosandey V.

Published data. [1)]Engadine, Pontresina, dans l'Inn, [1)]Alpes bernoises, Petite Scheidegg and [1)]Alpes bernoises, Wengernalp (Guignot 1931–1933); [2)]1 ex., GR, Col de la Flüela, 2400 m, 16.VII.1976 by Scherler P. and [2)]1 ex., VS, Val Ferret, Lacs de Fenêtre, 5.VIII.1957 by Scherler P. (Brancucci 1979b); 1 ex., Buffalora Alm (Graubünden), Nähe Ofenpass, 1983, by Schaeflein H. (Schaeflein 1989).

Comment. This species occurs very locally in the mountainous regions of Europe, from the French Alps (Haute-Savoie and Isère according to Guignot (1947) and Bameul and Queney (2014)) to Bulgaria and Poland. In Switzerland, it is known from a dozen localities scattered throughout the Alps. As mentioned by Carron (2005), the individuals cited by Brancucci (1979c) are misidentified *H. longulus*. *Hydroporus kraatzi* has a semi-subterranean ecology, which probably explains, at least partially, the rarity of its observations (Fery 2009).

C54) *Hydroporus longicornis* Sharp, 1871

Examined material. 2 ex., VD, Pramagnon, V.1964, leg. Toumayeff G., MHNG; 1 ex., Kt. Bern, Reutigen, VII.1967, leg. and coll. Linder A., ETH; 1 ex., VD, Grangettes, V.1972, leg. Toumayeff G., MHNG; 2 ex., Vaud, Prévondavaux, 2.V.1974, leg. Comellini A., MHNG; 1 ex., Vaud, La Rippe, 4.IV.1976, leg. Comellini A., MHNG; 1 ex., Helvetia, VD, St. Tryphon, Les Iles, 5.X.1978, leg. Sekaly V., coll. Scherler P., NMBE; 1 ♂, Riggisberg BE, 12.VII.2021, leg. and coll. Cosandey V.; 1 ex., Trélex VD, 17.IV.2022, leg. and coll. Cosandey V.

Published data. Les Grangettes, leg. Tourmojew [Toumayeff G.] and 6 ex., St-Tryphon, Les Iles, 5.X.1978 by Sekaly V. (Brancucci 1979c); [1)]Umbrail-Pass in Graubünden, 2200 m, 13.VII.1978 by Rössler G., det. Schaeflein H. (Schaeflein 1983); 1 ex., Trélex VD, 2022, by Cosandey V. (Pétremand et al. 2023).

Comment. This semi-subterranean species is very discreet and colonizes springs and small water resurgences (Nilsson and Holmen 1995; Carron 2005). It is known from a very limited number of occurrences in Switzerland, mainly at the foot of the Jura (Pétremand et al. 2023). The alpine specimens cited by Schaeflein (1983) could refer to other species of black *Hydroporus* from high altitudes. This species is more widely distributed in the Palaearctic region than *H. kraatzi*, which has a similar ecology.

C55) [*Hydroporus morio* Aubé, 1838]

Published data. [1)]Bergliseeli by Heer O., [1)]Klausenpass by Heer O. and [1)]Prünellalp im Engadin [Piz Prünella] by Heer O. (Heer 1837); [1)]Bodensee by Täschler M. and [1)]St. Gallen by Täschler M. (Täschler 1872); [1)]Il Fuorn, 17.IX.1934 by Nadig A. (Handschin 1963); [1)]La Vraconnaz, 1985 by Mulhauser G. (Mulhauser et al. 1987).

Comment. This species is distributed in the north of the Holarctic region. No Swiss specimen has been found in the examined collections. The occurrences in the literature probably concern other *Hydroporus* species, in particular *H. melanarius* with which a taxonomic confusion has arisen (see Carron 2005). The presence of *H. morio* remains possible in Switzerland, however, as it is present in southern Germany in the Land Bayern (Köhler and Klausnitzer 1998) even though the nearest locality is more than 100 km from the Swiss border (Bleich et al. 2016).

C56) [*Hydroporus notatus* Sturm, 1835]

Published data. [1)]Tourbière du Cachot by Matthey W. (Matthey 1971); [1)]La Vraconnaz, 1985 by Mulhauser G. (Mulhauser et al. 1987).

Comment. This Euro-Siberian species colonizes northern Europe from France to Siberia (Guignot 1947; Nilsson and Holmen 1995). In France, it is cited in the north and east of the country (Guignot 1947; Bameul and Queney 2014) but is not known in Alsace (Callot 2018). In southern Germany, the nearest population is located in the Land Bayern (Köhler and Klausnitzer 1998), more than 200 km away from the Swiss border (Bleich et al. 2016). In Switzerland, no specimens attest its presence in the country. The literature occurrences could not be verified but certainly concern related species. Curiously, the species was not discussed by Carron (2005).

C57) [*Hydroporus obsoletus* Aubé, 1838]

Examined material. [3,4,6,8)]1 ex., Basel, leg. Anonymous, NMB.

Published data. [1)]Basel in einem kleinen Bach im Frühjahr by Bischoff-Ehinger A. (Stierlin and Gautard 1867); [1)]Bois de Chênes, Ferreyres-Moiry by Scherler P. (Scherler et al. 1989).

Comment. According to Guignot (1947), this species colonizes the sublittoral regions of Western Europe, from Norway to Spain and Portugal, via Italy and North Africa. In Germany, the nearest populations are located at more than 200 km from the Swiss border (Bleich et al. 2016). In France, it is only known from the south of the country and in Corsica (Bameul and Queney 2014). In Italy, it is also known from the southern part of the country (Franciscolo 1979). Only one specimen with imprecise labeling (no date and imprecise locality) is known from Switzerland. It should therefore be disregarded. The published occurrences probably concern other misidentified *Hydroporus* species (Carron 2005), as is the case for the Scherler et al. (1989) citation, which probably concerns a misidentified *H. discretus*. *Hydroporus obsoletus* does not belong to the Swiss fauna.

C58) *Hydroporus scalesianus* Stephens, 1828

Examined material. 3 ex., Pfäffikon ZH, 8.IX.2008, leg. Carron G., ETH; 10 ex., Zürich ZH, 7.V.2024, leg. and coll. Chittaro Y., Cosandey V. and Sanchez A.

Published data. Auslikerriet, Pfäffikon, 8.IX.2008 by Carron G. (Carron 2009).

Comment. This species is distributed from France (northern half, center, and southwest, according to Bameul and Queney [2014]) to Great Britain. It was also recorded in northern Italy (Franciscolo 1979), the Czech Republic, and Russia (Nilsson and Holmen 1995). In Switzerland, it has only been found twice in two marshes near Zurich. As this species is known from Vorarlberg in Austria, near the mouth of the Rhine in Lake Constance (Brandstetter and Kapp 1995), as well as in southern Germany (Köhler and Klausnitzer 1998; Bleich et al. 2016), it should be found in other localities of northeastern Switzerland.

C59) [*Hydroporus striola* (Gyllenhal, 1826)]

Published data. [1)]Econaz by Favre E. and [1)]Guercet près Martigny by Favre E. (Favre 1890); [2)]3 ex., bei Leuk, VI.1942 by Linder A. (Linder 1946); [2)]Scuol, 1.VIII.1946 by Linder A. (Handschin 1963); [2)]Egnach, Schilfboden gegen Salmsach, X.1962 by Hugentobler H. and [1)]St. Gallen by Täschler M. (Hugentobler 1966).

Comment. This Holarctic species is distributed in northern and central Europe and reaches as far east as Sibiria. All specimens labeled as *H. striola* in Swiss collections were misidentified and referred to other species (Carron 2005). All the data in the literature probably also concern misidentified specimens, as in the case of the specimens from Leuk (Linder 1946) and Scuol (Handschin 1963), which are in fact *H. incognitus* and the one from Egnach (Hugentobler 1966), which was *H. palustris*. This species is not considered part of the Swiss fauna but could be present in the country, as indicated by localities in Alsace (Callot 1990, 2018), and in Vorarlberg a few kilometers from the border (Brandstetter and Kapp 1995), as well as in southern Germany (Köhler and Klausnitzer 1998; Bleich et al. 2016).

C60) [*Hydroporus tessellatus* (Drapiez, 1819)]

Published data. [2)]Laghetto Chiasso by Fontana P. (Fontana 1922).

Comment. The published occurrence concerned a misidentified *H. marginatus* (Carron 2005). This species occurs throughout France but is more common in the Mediterranean region (Guignot 1947; Bameul and Queney 2014). As it is widely distributed in Italy (Franciscolo 1979), its presence in southern Ticino cannot be ruled out but needs to be confirmed.

C61) [*Graptodytes flavipes* (Olivier, 1795)]

Examined material. [3,4,6,8)]1 ex., Aarau, leg. Anonymous, NMAA; [3,4,6,8)]3 ex., Suisse, Argovie, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Bern, leg. Anonymous, ETH; [3,4,6,8)]3 ex., Genf, leg. and coll. Lasserre H., ETH; [3,4,6,8)]2 ex., Kt. Wallis, leg. Täschler M., coll. Linder A., ETH; [3,4,6,8)]2 ex., Martigny, leg. Favre E., HGSB; [3,4,6,8)]2 ex., Suisse, Valais, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6,8)]6 ex., Valais, 7.IV.1904, leg. and coll. Gaud A., MZL.

Published data. [1)]Bern by von Ougspurger F. P., [1)]Genf by Lasserre H. and [1)]Zürich by Heer O. (Heer 1837); [1)]Wallis by Venetz I. (Stierlin and Gautard 1867); [3,4,6,8)]Martigny by Favre E. (Favre 1890); [1)]Yvonand-Estavayer-le-lac, Grande Cariçaie, 1995 by Badstuber A. (Mulhauser 1997); [1)]Grangettes,1992 (Naceur 1997).

Comment. This species is mainly distributed in the Mediterranean region. In France, it is present in coastal areas and is rarely found elsewhere (Bameul and Queney 2014). It reaches the Netherlands and Great Britain along the coast. Unlike Carron (2005), who considered

this species indigenous (probably on the basis of the specimen from Martigny), we do not consider it to be Swiss on the basis of the information available; all the individuals examined come from problematic collections whereas the literature occurrences cannot be verified. In Germany, the species is also no longer considered indigenous; although there are some records from the nineteenth century, these have not since been confirmed, and the species is not included in the latest German red list (Spitzenberg et al. 2016).

C62) [*Graptodytes ignotus* (Mulsant & Rey, 1861)]

Examined material. [3,4,6,8)]2 ex., Kt. Bern, leg. Täschler M., coll. Linder A., ETH.

Published data. [3,4,6,8)]2 ex., Kt. Bern by Täschler M., ETH (Carron 2005).

Comment. This meridional species is distributed in the western Mediterranean region of Europe and North Africa (Guignot 1947). It reaches as far north the Lyon region in France (Bameul and Queney 2014) and Piedmont and Liguria in Italy (Franciscolo 1979). *Graptodytes ignotus* is not retained as part of the Swiss fauna because the specimens labeled as "Swiss" are associated with the problematic collector M. Täschler (see Monnerat et al. 2015).

C63) [*Graptodytes varius* (Aubé, 1838)]

Published data. [1)]Bern by von Ougspurger F. P. (Heer 1837); [1)]Bord du Rhône à Aigle by Jaccard H. (Favre 1890).

Comment. While distributed in southern Europe and North Africa, this species is absent from Germany (Köhler and Klausnitzer 1998). In France, it is restricted to the south of the country and Corsica (Guignot 1947; Bameul and Queney 2014), as it is in Italy (Franciscolo 1979). According to Carron (2005), the Jaccard collection has been lost, so citations in the literature remains unverifiable. This species does not belong to the Swiss fauna.

C64) [*Metaporus meridionalis* (Aubé, 1838)]

Published data. [1)]4 ex., Genf by Tournier H. (Carron 2005).

Comment. This species has a western mediterranean distribution (Toledo and Hosseinie 2003). It is known from North Africa, the Iberian Peninsula, southwestern France (Bameul and Queney 2014), and northeastern Italy (Franciscolo 1979), as well as Corsica, Sardinia, and Sicilia. The specimens cited by Carron (2005), which should be deposited in the MHNG collection, could not be found again. In any case, *Metaporus meridionalis* does not belong to the Swiss fauna.

C65) *Rhithrodytes crux* (Fabricius, 1792)

Examined material. 10 ex., TI, Indemini, Laveree, VII.1971, leg. Toumayeff G., MHNG; 6 ex., Indemini, 20.VIII.1971, leg. and coll. Scherler P., NMBE; 1 ex., Suisse, Vaud, Arzier, ruisseau, 28.VIII.1994, leg. Besuchet C., MHNG.

Published data. Indemini, VII.1971 by Toumayeff G. (Allenspach 1978); 1 ex., Arzier VD, 28.VIII.1994 by Besuchet C., MHNG (Carron 2005).

Comment. This rare species is only known from Italy, France, and Switzerland. In Switzerland, *R. crux* is known from two distant localities, one in Ticino and the other in the canton of Vaud. This species colonizes torrents and streams in limestone regions. In France, it is known from Haute-Savoie and the southeast of the country (Bameul and Queney 2014), while it is mentioned in northwest Italy (Franciscolo 1979).

C66) [*Stictonectes lepidus* (Olivier, 1795)]

Examined material. [3,4,6,8)]2 ex., Genève, leg. Anonymous, MHNG.

Published data. [3,4,6,8)]2 ex., Genève, [1,8)]2 ex., Genève by Tournier H., MHNG and [1,8)]1 ex., Yverdon VD, Moor am Seeufer, 1953 by Besuchet C., MZL (Carron 2005).

Comment. According to Guignot (1947), this is a western European species, distributed from Portugal to the British Isles and as far west as Germany. In France, Guignot (1947) and Bameul and Queney (2014) mention its presence over almost the entire country but indicate that it is absent from the Paris region and the northern and eastern regions. In Italy, it is not considered indigenous (Franciscolo 1979). In Germany, there are two reliable records of the species (Schlaeflein 1989; Bleich et al. 2016), but the species is not considered established and is therefore not assessed in the latest national red list (Spitzneberg et al. 2016). We also believe that the species is not established in Switzerland either. In Switzerland, Carron (2005) claims to have seen a specimen from Yverdon collected by C. Besuchet. However, this individual could not be found in the collections consulted. If this specimen shows up again, it would have to be regarded as erratic; this region was very well prospected in the last decades and the species was never found again.

C67) [*Hydrovatus clypealis* Sharp, 1876]

Published data. [1,8)]Basel and [1,8)]Katzensee (Stierlin 1900).

Comment. As already mentioned by Carron (2005), no specimen of *H. clypealis* was collected in Switzerland and the species can therefore not be considered indigenous. This species mainly colonizes the coastal areas of the British Isles, the Iberian Peninsula, Italy, the Balkans, and North Africa. In France, this sporadic species is known by sparse occurrences, mostly situated on the littoral and sublittoral areas (Guignot 1947; Bameul and Queney 2014), like in Italy, where its septentrional limit is situated at more than 100 km from the Swiss border (Franciscolo 1979).

C68) *Hygrotus* (*Coelambus*) *confluens* (Fabricius, 1787)

Examined material. [3,4,6)]1 ex., Genève, Aïre, leg. and coll. Maerky C., MHNG; [3,4,6)]2 ex., Genève, Cointrin, leg. Preudhomme de Borre C. F. P. A., coll. Maerky C., MHNG; [3)]1 ex., Genève, leg. Anonymous, MHNG; [3,4,6)]2 ex., Pomy, leg. Täschler M., coll. Spälti A., MHNG; [3,4,6)]1 ex., Suisse, leg. Anonymous, MHNG; [3,4,6)]1 ex., Suisse, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6)]3 ex., Suisse, Vaud, leg. Preudhomme de Borre C. F. P. A., coll. Maerky C., MHNG; [3,4,6)]1 ex., Rouelbeau, 22.IV., leg. and coll. Maerky C., MHNG; [3,4,6)]5 ex., Genève, Villette, 1.VI., 6.VI., 18.VI., leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, Rouelbeau, 26.IV., leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, Sionnet, 5.V., leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, Sierne, 9.V., leg. and coll. Maerky C., MHNG; [3,4,6)]4 ex., Villette, 1.VII., leg. and coll. Maerky C., MHNG; 1 ex., Lac de Joux, IX.1909, leg. and coll. Gaud A., MZL; 3 ex., Helvetia, BE, Liesberg, 6.VI.1976, leg. Brancucci M., NMB; 1 ex., Kt. Bern, Bern, IV.1977, leg. and coll. Linder A., ETH; 4 ex., Helv., Kt. Bern, Burgäschisee, 11.III.1978, leg. Kiener S., MHNG; 1 ex., Helv., Kt. Bern, Burgäschisee, 9.VIII.1979, leg. Kiener S., MHNG; 1 ex., VD, Bioley-Orjulaz, VII.1983, leg. Toumayeff G., MHNG; 5 ex., VD, Bioley O[rjulaz]., L. Coffy, VIII.1983, leg. Toumayeff G., MHNG; 1 ex., VD, Bavois, Bernoise, IX.1984, leg. Toumayeff G., MHNG; 1 ex., VD, Bavois, Bernoise, X.1984, leg. Toumayeff G., MHNG.

Published data. [1)]Bern by von Ougspurger F. P., Lac de Joux by Mellet L. and [1)]Pomy by Mellet L. (Heer 1837).

Comment. This species is widespread in the Palaearctic region but sporadic in Switzerland as well as in surrounding regions (Franciscolo 1979; Callot 1990; Brandstetter and Kapp 1995; Bameul and Queney 2014; Bleich et al. 2016). It was last found in Switzerland in 1984.

C69) [*Hygrotus* (*Coelambus*) *parallelogrammus* (Ahrens, 1812)]

Examined material. [3,4,6)]1 ex., Suisse, Aarberg, leg. and coll. Maerky C., MHNG; [3,4,6)]2 ex., Genf, leg. Täschler M., coll. Spälti A., MHNG; [3,4,6)]2 ex., Suisse, Regensdorf, 14.VI, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, 24.XII.1904, leg. Gaud A., MZL.

Published data. [1)]Genf (Heer 1841); Zürich by Isenschmid M. (Stierlin 1883); [1)]Gegend von Schaffhausen by Stierlin G. (Stierlin 1900); [3,4,6)]1 ex., Genf, 24.XII.1904 by Gaud A., MZL, [3,4,6)]2 ex., Genf and [3,4,6)]2 ex., Regensdorf ZH by Maerky C., MHNG (Carron 2005).

Comment. The few individuals labeled as "Swiss" all come from problematic collections and cannot therefore be considered reliable, while the data in the literature are impossible to verify. This species does not belong to the Swiss fauna, contrary to the opinion of Carron (2005). Although this species is widely distributed in the Palaearctic region (from Spain to eastern Siberia), it is absent from regions close to Switzerland. For example, it is not known in Alsace (Callot 2018), while the nearest populations in Germany are located at more than 150 km from the Swiss border (Bleich et al. 2016). Generally, in Italy as in France, this species is found mainly in coastal areas (Franciscolo 1979; Bameul and Queney 2014).

C70) *Hygrotus* (*Hygrotus*) *quinquelineatus* (Zetterstedt, 1828)

Examined material. 1 ex., SO, Seewen, VII.1956, leg. Toumayeff G., MHNG; 1 ex., Altenrhein, 21.V.1967, leg. Hugentobler H., NMSG; 1 ex., Suisse, St. Gall, Altenrhein, marais, 6.VI.1976, leg. Besuchet C., MHNG; 1 ex., Leuggern AG, 26.V.2004, leg. Lubini V., ETH; 1 ex., Stein am Rhein SH, 12.X.2004, leg. Lubini V., ETH.

Published data. 1 ex., Altenrhein, IV.1961 by Linder A. and 1 ex., Seewen SO, im Bassin des Elektrizitätswerkes, 12.VII.1957 by Toumayeff G. (Allenspach 1978).

Comment. This species is distributed throughout the northern Palaearctic region. It is considered part of the Swiss fauna based on only five captures, all made in the northeast of the country, mainly near Lake Constance. It could be present more widely in northern Switzerland as it is well distributed in Alsace (Callot 1990, 2018), in Vorarlberg near the mouth of the Rhine (Brandstetter and Kapp 1995), and in Baden north of Lake Constance as well as along the Rhine north of Basel (Köhler and Klausnitzer 1998; Bleich et al. 2016).

C71) [*Hyphydrus aubei* Ganglbauer, 1891]

Examined material. [3,4,6,8)]1 ex., Genève, leg. Anonymous, MHNG; [3,4,6,8)]1 ex., Schaff-hsn. [Schaffhausen], leg. and coll. Burghold W., NMBE.

Published data. [3,4,6,8)]1 ex., Schaffhausen, 1978, coll. Burghold W., NMBE and [3,4,6,8)]1 ex., Genf, MHNG (Carron 2005).

Comment. The two specimens examined are too incompletely labeled to allow this southern species to be considered part of the Swiss fauna. Moreover, these two localities are hardly credible if we consider that *H. aubei* is absent from adjacent regions. In France, it is only present in the west of the country and in the southern half (Bameul and Queney 2014) and is not recorded for Alsace (Callot 2018), the occurrences being based on a problematic collection. It is also absent from Germany (Bleich et al. 2016). In Italy, its nearest populations are located at more than 100 km from the Swiss border (Franciscolo 1979). Contrary to the opinion of Carron (2005), we do not include this species in the Swiss list.

C72) [*Aulonogyrus* (*Aulonogyrus*) *striatus* (Fabricius, 1792)]

Examined material. [3,4,6,8)]1 ex., Crevin, coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Plan les Ouates, coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Sionnet, coll. Maerky C., MHNG; [3,4,6,8)]2 ex., Pl. les-Ouates, Genève, 11.IV., coll. Maerky C., MHNG;

[3,4,6,8)]1 ex., Sionnet, 16.V., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Jura, Gimel, 10.VI., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Carouge, 11.VI., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Alpes, Lavey, 12.VI., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Jura, Gimel, 6.VII., leg. Maerky C., MHNG; [3,4,6,8)]1 ex., Suisse, Regensdorf, 14.VII., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Sionnet, 20.VII., coll. Maerky C., MHNG.

Published data. [1)]CH [Switzerland] (Brancucci 1994).

Comment. This species is distributed in the Mediterranean region in Europe, North Africa, and Asia (Hájek and Fery 2017). In Italy, its nearest populations are located more than 200 km from the Swiss border (region of San Remo) (Fanciscolo 1979). All the specimens examined come from the problematic collection of C. Maerky, which should not be considered. Consequently, *Aulonogyrus striatus* does not belong to the Swiss fauna, as already pointed out by Carron (2008).

C73) [*Gyrinus* (*Gyrinus*) *aeratus* Stephens, 1835]

Examined material. [3)]1 ex., Suisse, Zurich, leg. Preudhomme de Borre C.F.P.A., coll. Maerky C., MHNG.

Published data. [1)]CH [Switzerland] (Brancucci 1994); [1)]Grande Cariçaie, Portalban-Cudrefin, 30.X.1993, 16.VIII.1994 (Scherler 1995).

Comment. This species is widely distributed in northern and eastern Europe, Asia, and the Nearctic region (Hájek and Fery 2017). It is absent from Alsace (Callot 2018) and only mentioned in old records from southern Germany (Bleich et al. 2016). The specimen in the MHNG collection belongs to the problematic collection of C. Maerky and should therefore not be taken into account. Although P. Scherler's collection is credible, the specimens he cited (Scherler 1995) were not found in his collection and must therefore have considered misidentified material, as already assumed by Carron (2008). This species does not exist in Switzerland.

C74) [*Gyrinus* (*Gyrinus*) *caspius* Ménétriés, 1832]

Examined material. [3,4,6,8)]1 ex., Genève, Rouelbeau, coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Suisse, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Genève, Vessy, coll. Maerky C., MHNG.

Published data. [1)]CH [Switzerland] (Brancucci 1994); [1)]? Grangettes (Naceur 1997).

Comment. The only three "Swiss" specimens examined are from Charles Maerky's collection and should not be considered, while the literature citations are not verifiable. In addition, and although widely distributed in the Palaearctic region (Hájek and Fery 2017), the species is not mentioned in regions neighboring Switzerland. Indeed, in Germany, the species only exists in the north (Köhler and Klausnitzer 1998; Bleich et al. 2016), whereas in France it colonizes the Mediterranean area and the coastal areas of the Atlantic Ocean and the English Channel (Guignot 1947). *Gyrinus caspius* is not part of the Swiss fauna, as already indicated by Carron (2008).

C75) [*Gyrinus* (*Gyrinus*) *colymbus* Erichson, 1837]

Published data. [1)]Katzensee and [1)]Zürich am Horn (Heer 1841); [1)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867); [2)]Champagnes de Fully by Favre E., [2)]entre Guercet et pont de vers l'Eglise de Fully by Favre E. (Favre 1890).

Comment. There are no Swiss specimens of this species in the collections examined. The specimens cited by Favre (1890) were *Gyrinus substriatus*, and the other citations are not supported by any specimen, but probably refer to misidentified *G. distinctus* (Carron 2008). In addition, the species is not known from the regions surrounding Switzerland. It is not included in the list for Alsace (Callot 2018), nor in the German fauna (Köhler 2011; Bleich et al. 2016), while it is only known from a very old record in Vorarlberg, Austria (Brandstetter and Kapp 1995), which is probably doubtful. In Italy, the few records from the northern third of the country are unreliable (Franciscolo 1979). Despite its wide distribution in the Palaearctic region (Hájek and Fery 2017), particularly in the Mediterranean zone, this species is not included in the Swiss fauna.

C76) [*Gyrinus* (*Gyrinus*) *dejeani* Brullé, 1832]

Examined material. [3,4,6)]1 ex., Suisse, coll. Maerky C., MHNG.

Comment. This species is mainly distributed in the Mediterranean region (Hájek and Fery 2017). In the north, it reaches central Italy (Franciscolo 1979), while in France it reaches the Lyon region (Guignot 1947). In Switzerland, only one specimen from the collection of C. Maerky is labeled as Swiss, without any further details. This collection being problematic, it should not be considered. As already pointed out by Carron (2008), this species does not belong to the Swiss fauna.

C77) [*Gyrinus* (*Gyrinus*) *natator* (Linnaeus, 1758)]

Published data. [1)]Helvetia (Heer 1841); Zürich by Dietrich K. (Dietrich 1865); [1)]Buchser-See [Buchs SG] by Rietmann O., [1)]St. Gallen by Täschler M., [1)]zwischen Rorschach und Horn am Bodensee by Täschler M. (Täschler 1872); [1)]Rheintal bis Thusis and [1)]Schiers by Wirz, [1)] Kästris bei Killias E. (Caflisch 1894); [1)]Gegend von Schaffhausen by Stierlin G. (Stierlin 1906); [1)]Chiasso by Fontana P. (Fontana 1947); [1)]Tourbière du Cachot by Matthey W. (Matthey 1971).

Comment. No Swiss specimens exist in the examined collections, as already mentioned by Carron (2008). Literature references to specimens that could be located in collections turned out to be misidentified *G. substriatus* or *G. suffriani*. Widely distributed in Europe (Hájek and Fery 2017), this Euro-Siberian species is known from Württemberg, near the Swiss border (Köhler and Klausnitzer 1998; Bleich et al. 2016). Its (past?) presence in the north of Switzerland therefore remains a possibility.

C78) [*Gyrinus* (*Gyrinus*) *opacus* C.R. Sahlberg, 1819]

Published data. [1,8)][Schweiz] ? (Bremi-Wolf 1856); [1,8)] Zürich by Heer O. (Stierlin and Gautard 1867).

Comment. This species is only cited from Switzerland by two old literature sources, without any reference specimen in the consulted collections. *Gyrinus opacus* is distributed in the north of the Holarctic region (Hájek and Fery 2017) and does not belong to the Swiss fauna.

C79) [*Gyrinus* (*Gyrinus*) *urinator* Illiger, 1807]

Examined material. [3,4,6,8)]1 ex., Basel, coll. Dietrich K., ETH; [3,4,6,8)]3 ex., Suisse, Bern, leg. Preudhomme de Borre C.F.P.A., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Carouge, leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Katzensee, leg. Heer O., ETH; [3,4,6,8)]4 ex., Katzensee, leg. Täschler M., coll. Spälti, MHNG; [3,4,6,8)]1 ex., Suisse, Regensdorf, leg. Preudhomme de Borre C.F.P.A., coll. Maerky C., MHNG; [3,4,6,8)]3 ex., Suisse, leg. Anonymous, coll. Maerky C., MHNG; [3,4,6,8)]3 ex., Suisse, Tessin, leg. Preudhomme de Borre C.F.P.A., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Vessy, leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Suisse, Zurich, leg. Preudhomme de Borre C.F.P.A., coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Genève, Carouge, 21.V., leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Jura, Thoiry, 21.VI., leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Suisse, Regensdorf, 11.VII., leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Jura, Burtigny, 15.VII., leg. and coll. Maerky C., MHNG; [3,4,6,8)]2 ex., Alpes, Orsières, 15.VII., leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Alpes, Bex, 22.VII., leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Jura, Bière, 22.VII., leg. and coll. Maerky C., MHNG; [3,4,6,8)]1 ex., Jura, Le Vaud, 11.VIII., leg. and coll. Maerky C., MHNG; [3,4,6,8)]2 ex., Alpes, Schuls, 16.VIII., leg. and coll. Maerky C., MHNG.

Published data. [1)]Dübendorf and [1)]Katzensee (Heer 1841); [1)]Bern by Isenschmid M. (Stierlin 1883).

Comment. Most specimens of *G. urinator* deposited in Swiss collections are related to the collection of C. Maerky and cannot be considered reliable (Carron 2008; Monnerat et al. 2015). Carron (2008) nevertheless considered this species indigenous based on specimens from Dübendorf, Katzensee, and Basel. However, as these collections are not entirely reliable and the labels incomplete, we consider that the information available is insufficient to retain this species for Switzerland. Furthermore, this species has a mainly southern distribution (Hájek and Fery 2017) and does not occur in regions adjacent to Switzerland.

C80) [*Brychius glabratus* (A. Villa & G.B. Villa, 1835)]

Published data. [1)][Schweiz] by Heer O. (Bremi-Wolf 1856); [1)]Tessin by Heer O. (Stierlin and Gautard 1867).

Comment. In Switzerland, there are only two imprecise references in the literature. They are not supported by specimens in Swiss collections and therefore cannot be considered valid, even if this species is easily identified. Currently endemic to Italy (van Vondel 2017), its presence in canton Ticino remains possible (Franciscolo 1979) but needs to be confirmed, as already mentioned by Carron (2008).

C81) [*Haliplus* (*Haliplus*) *apicalis* C.G. Thomson, 1868]

Published data. [1,8)]Yvonand-Estavayer-le-lac, Grande Cariçaie, 1995 (Mulhauser 1997).

Comment. In Switzerland, this species is only mentioned in Mulhauser's (1997) publication on the fauna of the Grande Cariçaie nature reserve, but no specimens have been deposited in any of the collections examined. This species is distributed in the northern part of the Holarctic region (van Vondel 2017) and does not exist in Switzerland or in neighboring regions.

C82) [*Haliplus* (*Haliplus*) *fulvicollis* Erichson, 1837]

Published data. [1)]Brütten, 25.VI.1854 and 15.IX.1854 by Dietrich K. (Dietrich 1865); [1)]Schaffhausen by Stierlin G. (Stierlin and Gautard 1867); [1)]La Rivaz in Tessin [Riva] by Frey-Gessner E. (Stierlin 1883); [1)]Sisselen (Stierlin 1900).

Comment. Only very old literature sources mention this species for Switzerland and no reference specimen has been found in the Swiss collections, as already noted by Carron (2008). It is possible that these occurrences are the result of confusions with the nomen of *H. flavicollis*. This species exists in Germany but is absent or dubiously present in the southern Länder close to Switzerland (Köhler and Klaunitzer 1998; Köhler 2011), while in France it is known only from the north of the country and from the Ardennes (Bameul and Queney 2014). Although widely distributed (van Vondel 2017), this Euro-Siberian species appears to be absent from Switzerland.

C83) *Haliplus* (*Haliplus*) *immaculatus* Gerhardt, 1877

Examined material. [3)]1 ex., Genf, leg. Täschler M., MHNG; 2 ex., Rheinau, IV.1913, leg. and coll. Jörger J. B., NMB; 1 ex., Zch, Dietikon, 19.III.1938, leg. and coll. Allenspach V., NMB; 2 ♂, SO, Seewen, VII.1956, leg. Toumayeff G., MHNG; 1 ex., Kt. St. Gallen, Altenrhein, VII.1968, leg. and coll. Linder A., ETH; 1 ex., Helvetia, NE, Entre deux Monts, mare, 13.VI.1976, leg. Brancucci M., NMB; 1 ♂, CH, FR, Kleinbösingen, Auried, 27.V.1991, leg. Hoess R., NMBE; 4 ex., Arlesheim, Wider, 7.V.1992, 15.V.1992, leg. Anonymous, NMB; 3 ♂, BL9999 [Anwil, Talweiher], 8.VII.1997, leg. Auderset Joye D., LEBA; 1 ♂, ZG0043, Plans d'eau CH [Risch, Binzmühleweiher], 6.VIII.1997, leg. Oertli B., LEBA; 1 ♂, BS0010 [Riehen, Autal], 9.VII.1998, leg. Oertli B., LEBA; 1 ex., Jussy GE, 22.VII.2002, leg. Oertli B., LEBA; 1 ♂, Le Chenit VD, 9.VII.2005,

leg. Carron G., ETH; 2 ex., Seltisberg BL, 27.IV.2010, leg. Brancucci M., coll. Geiser M., NMBE; 1 ♂, 1 ♀, Vandoeuvres GE, 2.IV.2012, leg. Anonymous; 1 ♂, Rottenschwil AG, 3.V.2021, leg. Birnstiel E., MZL; 1 ♂, Rottenschwil AG, 6.IX.2021, leg. and coll. Birnstiel E.; 1 ♂, Bettens VD, 13.VIII.2021, leg. and coll. Chittaro Y.; 1 ♂, Yvonand VD, 13.VIII.2021, leg. and coll. Chittaro Y.; 2 ♂, Yvonand VD, 9.IX.2021, leg. and coll. Cosandey V.; 2 ♂, Yvonand VD, 17.VI.2022, leg. and coll. Cosandey V.

Published data. [1)]Hemberg, Bendelmoos, VI.1959 by Hugentobler H. (Hugentobler 1966); [1)]Untervaz by Jörger J. (Linder 1967); [1)]Marais de Kloten, 3.IX.1969 by Gassmann M. (Gassmann 1974).

Comment. The dissection of most males of *Haliplus* (*Haliplus*) spp. deposited in Swiss natural history collections has enabled clarification of the distribution of *H. immaculatus*, which is rare in Switzerland. It is mainly present on the Plateau and in the Jura but seems absent from the Alpine valleys and Ticino. It occurs in northern and central Europe (van Vondel 2017).

C84) [*Haliplus* (*Haliplus*) *lineolatus* Mannerheim, 1844]

Published data. [1)]Untervaz by Jörger J. B. (Linder 1967).

Comment. As mentioned by Carron (2008), no specimen originating from Switzerland is deposited in a Swiss museum and no literature citations exist. The citation from Linder (1967) concerns *Haliplus wehnckei* Gerhardt, 1877, falsely considered a synonym of *H. lineolatus* (whereas it is a synonym of *H. sibiricus*). This species appears to be erroneously cited for Switzerland in the Palaearctic catalogue by van Vondel (2017). Known in Germany in the Württemberg region (Köhler and Klausnitzer 1998) and recently in Bavaria (Bleich et al. 2016), this Euro-Siberian species remains a possibility in Switzerland. According to Bameul and Queney (2014), the citations from France (Guignot 1947) are erroneous and refer to *H. sibiricus*. This species is also absent from Italy (Franciscolo 1979).

C85) *Haliplus* (*Liaphlus*) *fulvus* (Fabricius, 1801)

Examined material. [3,4,6)]1 ex., Aarau, leg. Blösch C., NMAA; [3,4,5,6)]2 ex., Basel, leg. Anonymous, NMB; [3,4,6)]2 ex., Katzensee, leg. Täschler M., MHNG; 1 ex., Schaffhausen, leg. Anonymous, ETH; 1 ex., Schaffh., leg. Böschenstein A., NMSH; 2 ex., Wiedl. See [Widlersee], 14.IV.1880, leg. Böschenstein A., NMSH; 1 ex., Vaux [Vaux-sur-Morges], 10.VI.1901, leg. and coll. Gaud A., MZL; 1 ex., Wallis, 1908, leg. de Brenzinger, ETH; 1 ex., Nidau, IX.1910, leg. Mathey A., NMBE; 1 ex., Rheinau, IV.1913, leg. and coll. Jörger J. B., NMB; 5 ex., BE, Nidau, 9.VIII.1921, leg. Mathey A., NMBE; 15 ex., Kt. Bern, Büren a. A., V.1938, IV.1939, X.1943, V.1946, V.1947, VI.1950, leg. and coll. Linder A., ETH; 1 ex., Katzensee, 6.III.1948, leg. and coll. Allenspach V., NMB; 1 ex., marnière, Hauterive, Neuchâtel, Suisse, 25.V.1951, leg. Aellen V., MHNG; 1 ex., OW 0167 [Sarnen, Sewensee,], 23.VIII.1996, leg. Oertli B., LEBA; 5 ex., Oberwil BL, 26.IV.2023, leg. and coll. Cosandey V.; 11 ex., Bonfol JU, 12.VI.2023, leg. and coll. Chittaro Y.; 1 ex., Flaach SH, 12.IX.2023, leg. and coll. Sanchez A.

Published data. [1)]Bern by von Ougspurger F. P., [1)]Genf by Chevrier F., [1)]Jura by Mellet L., [1)]Lac de Joux by Mellet L., [1)]Neuchâtel by Mellet L., [1)]Pomy by Mellet L. and [1)]Vall-Orbes by Mellet L. (Heer 1837); [2)]Guercet près Martigny by Favre E. and [1)]Vaux , V., by Bugnion E. (Favre 1890); [2)]nel Lago a Riva S. Vitale, VI.1914 by Fontana P. (Fontana 1922); [1)]Frauenfeld, Ziegelweiher im Gill, VII.1953 by Hugentobler H. (Hugentobler 1966).

Comment. Among all European Haliplidae, *H. fulvus* has the widest distribution (van Vondel 1997); it is present in most of the Palaearctic region and in the north of the Nearctic, colonizing various sections of water (fresh and brackish) with rich Characeae vegetation (van Vondel 1997). Surprisingly, it has been recorded only sporadically in Switzerland. It was found again in 2023 in three localities in the north of the country. The specimens cited by Favre (1890) from Martigny were in fact *H. obliquus*, while those from Riva S. Vitale cited by Fontana (1922) were *H. flavicollis*.

C86) *Haliplus* (*Liaphlus*) *mucronatus* Stephens, 1828

Examined material. [3,4,5,6)]1 ex., Basel, leg. Anonymous, NMB; 1 ex., Basel, coll. Stierlin G., MHNG; 2 ex., Burgdorf, coll. Rätzer A., NMBE and NMSO; 1 ex., Dübendorf, leg. Anonymous, ETH; 1 ex., Genève, leg. Böschenstein A., NMSH; [3,4,5,6)]1 ex., Schaffhausen, leg. Täschler M., MHNG; 2 ex., Valais, leg. Favre E., HGSB; [3,4,5,6)]1 ex., Suisse, leg. Anonymous, MHNG; 1 ex., Zch, Dietikon, leg. Keller, coll. Allenspach V., NMB; 2 ex., Genève, leg. and coll. Gaud A., MZL; 2 ex., Dh. [Diessenhofen TG], 1848, leg. and coll. Brunner J., NMSH; 1 ex., Wagner Riedt [Wangener Riedt], 28.VIII.1864, leg. and coll. Dietrich K., ETH; 1 ex., Peney, 20.III.1875, leg. Böschenstein A., NMSH; 1 ex., Aïre, 23.VII.1877, leg. Böschenstein A., NMSH;1 ex., Dörfl. [Dörflingen], 6.IX.1877, leg. and coll. Brunner J., NMSH; 1 ex., Vaux [Vaux-sur-Morges], 6.VI.1881, leg. and coll. Bugnion E., MZL; 1 ex., Kt. Bern, Aarwangen, IX.1929, leg. and coll. Linder A., ETH; 1 ex., CH, K. Zü, Oberengstringen, 25.III.1932, leg. and coll. Allenspach V., NMB; 1 ex., Aff., Zürich Umg., 10.VIII.1941, leg. and coll. Wolf J.-P., ETH; 1 ex., Hänsiried, Zürich Umg., 10.VIII.1941, leg. and coll. Wolf J.-P., ETH; 2 ex., Hänsiried, Zürich Umg., 17.IX.1941, leg. and coll. Wolf J.-P., ETH; 1 ex., Warth-Weiningen, Ochsenfurt, 30.VII.1952, leg. and coll. Hugentobler H., NMTG; 5 ex., Cartigny GE, 18.VIII.2021, leg. and coll. Cosandey V.; 1 ex., Avusy GE, 9.IX.2021, leg. and coll. Cosandey V.; 2 ex., Cartigny GE, 9.IX.2021, leg. and coll. Cosandey V.; 4 ex., Cartigny GE, 10.IX.2021, leg. and coll. Chittaro Y.

Published data. Dübendorf by Bremi-Wolf J. J. and [1)] Wallis by Lasserre H. (Heer 1837); [1)]Tös [Töss] ob Dättlikon in Lachen (Heer 1841); [1)]Niederschwerzenbach, 28.VIII.1864 by Dietrich K. (Dietrich 1865); [1)]Mühlenthal bei Schaffhausen by Stierlin G. (Stierlin and Gautard 1867); [1)]Genf by Böschenstein A. (Stierlin 1883).

Comment. This species is distributed in central and southern Europe, in the coastal areas of Morocco and Libya, as well as in Turkey, Iraq, and along the Black Sea (van Vondel 1997). It is very sporadic north of the Loire River in France (Bameul and Queney 2014). In Switzerland, historical occurrences of *H. mucronatus* are sporadically distributed at low elevation on the Plateau and in Geneva (Carron 2008, Fig. 7A). Substantial survey efforts in the canton of Geneva have led to its rediscovery after more than 50 years without data (Cosandey 2023). This species is found in fresh and brackish waters, and often colonizes gravel or Characeae clay quarries (Foster and Friday 2011; van Vondel 1997).

C87) *Peltodytes rotundatus* (Aubé, 1836)

Examined material. 1 ex., Moulin de Vert, GE, .IV.1953, leg. Simonet J., coll. Toumayeff G., MHNG; 2 ex., M.lin de Vert, 24.IV.1953, leg. Simonet J., MHNG; 5 ex., Genève, Moulin de Vert, 3.VIII.1984, leg. Besuchet C. and Scherler P., MHNG, NMBE; 1 ex., Verbois, 14.VIII.1986, leg. and coll. Scherler P., NMBE; 1 ex., Versoix, Combe Chapuis, 10.IV.1995, leg. Anonymous, LEBA; 1 ex., PLOCH GE0010 [Bois des Mouilles], 4.VII.1996, leg. Anonymous, LEBA; 1 ex., Versoix GE, 7.VI.2003, leg. Carron G., ETH; 2 ex., Versoix GE, 22.V.2005, leg. Carron G., LEBA; 4 ex., Russin GE, 12.VII.2005, leg. Carron G., ETH; 1 ex., Pregny-Chambésy GE, 2.IV.2012, leg. Anonymous; 2 ex., Laconnex GE, 23.IV.2020, leg. and coll. Cosandey V.; 1 ex., Meyrin GE, 23.IV.2020, leg. and coll. Cosandey V.; 1 ex., 15.IX.2021, Versoix GE, leg. and coll. Cosandey V.; 2 ex., Laconnex GE, 24.VIII.2021, leg. and coll. Cosandey V.; 1 ex., 27.VIII.2021, Gy GE, leg. and coll. Cosandey V.; 1 ex., Jussy GE, 7.X.2021, leg. and coll. Cosandey V.; 6 ex., Meyrin GE, 7.X.2021, leg. and coll. Cosandey V.; 3 ex., Collex-Bossy GE, 28.IV.2022, leg. and coll. Cosandey V.; 4 ex., Mendrisio TI, 22.V.2023, leg. and coll. Chittaro Y. and Sanchez A.

Published data. 9 ex., Cartigny, Moulin-de-Vert, 1953, 1984 by Toumayeff, 1 ex., Veytay, Gouille Marion, 1990 by Besuchet, 1 ex., Versoix, étang de Combe-Chapuis, 2003, 1 ex., étang de Richelien, 2005 and 4 ex., Russin, Teppes, 2005 (Carron 2008).

Comment. *Peltodytes rotundatus* could be expanding in Switzerland; historical records of this species are very rare, whereas it has recently been found regularly in the canton of Geneva in the last 20 years (Carron 2008; Cosandey 2023) and was detected for the first time in Ticino in 2023. This species is distributed mainly in southern Europe and North Africa.

C88) *Hygrobia hermanni* (Fabricius, 1775)

Examined material. 1 ex., Aigle, leg. and coll. Favre E., HGSB; [3,4,6)]1 ex., Bienne, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, Bienne, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Crevin, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, leg. and coll. Maerky C., MHNG; [3,4,6)]2 ex., Genf, leg. and coll. Lasserre H., ETH; [3,4,6)]1 ex., Genf, leg. and coll. Spälti A., MHNG; [3,4,6)]1 ex., Genève, Plan les Ouates, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, leg. Turretini, coll. Maerky C., MHNG; [3,4,6)]1 ex., Suisse, Carouge, leg. Frey, coll. Maerky C., MHNG; [3,4,6)]2 ex., Suisse, Meyrin, leg. Frey, coll. Maerky C., MHNG; [3,4,6)]1 ex., Genève, Veyrier, leg. and coll. Maerky C., MHNG; [3,4,6)]2 ex., Genève, Villette, leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Bienne, 18.V., leg. and coll. Maerky C., MHNG; [3,4,6)]1 ex., Crevin, 25.VI., leg. and coll. Maerky C., MHNG; 4 ex., Aigle, 4.VI.1908, 14.VI.1912, leg. and coll. Gaud A., MZL; 3 ex., Bavois, VD, IV.1972, leg. Toumayeff G., coll. Linder A., ETH and MHNG; 22 ex., VD, Bavois, V. and VI.1972, leg. Toumayeff G., MHNG; 34 ex., Bavois, 13.V.1972, leg. and coll. Scherler P., NMBE; 1 ex., VD, Bavois, Bernoise, IX.1972, leg. Toumayeff G., MHNG; 1 ex., VD, Goumoens, Tuilerie, V.1974, leg. Toumayeff G., MHNG; 12 ex., VD, Bavois, VIII.1975, leg. Toumayeff G., MHNG; 29 ex., VD, Bavois, Bernoise, VI.1983, VIII.1984, IX.1984, leg. Toumayeff G., MHNG; 1 ex., VD, Bavois, Cristallin, VIII.1984, leg. Toumayeff G., MHNG; 10 ex., CH, FR, Kleinbösingen, Auried, 15.XI.1990, 21.III.1991, 19.IX.1991, leg. Hoess R., NMBE; ? ex., GE, Bardonnex, Evordes, Drize, III.1995, leg. Perfetta J.; 1 ex., Hochfelden, 26.IV.1996, leg. Ettmüller W.; 7 ex., Jura, Bonfol, Champ de manche, 4.IX.1998, leg. Carron G., ETH; 1 ex., Meyrin GE, 2005, leg. Sandoz F.-A.; 1 ex., Ballens VD, 9.V.2005, leg. and coll. Chittaro Y.; 5 ex., Meinier GE, 13.IX.2005, leg. Carron G., ETH and LEBA; 1 ex., Vandoeuvres GE, 2.IV.2012, leg. Anonymous; 1 ex., Jussy GE, 26.VI.2012, leg. Anonymous; 1 ex., La Chaux (Cossonay) VD, 30.VII.2016, leg. and coll. Chittaro Y.; 3 ex., Bougy-Villars VD, 3.IV.2017, leg. and coll. Cosandey V.; 4 ex., Gy GE, 14.IX.2020, leg. and coll. Cosandey V.; 1 ex., Jussy GE, 18.V.2022, leg. and coll. Cosandey V.

Published data. [1)]Genf by Lasserre H. (Heer 1837); [1)]Jorat by Heer O. (Stierlin and Gautard 1867); Aigle by Jaccard H. (Favre 1890); Champ de Manche, 1998 by Carron G. (Carron 1999).

Comment. Widespread in Western Europe, only sparse records exist in Switzerland, which could be explained by the difficulty of catching the specimens. The species is a bottom-dweller that lives in muddy, stagnant water and prefers small, silty ponds rich in detritus and dense vegetation (Dettner 1997). Moreover, they can burry themselves in the substrate of ponds and remain there up to 30 minutes, rising to the sur-

face only briefly to breathe (Dettner 1997). They can also leave aquatic habitats for long periods (Kovac and Maschwitz 1990). Larvae hunt *Tubifex* worms in the mud (Dettner 1997).

Discussion

This study represents an update of the previously published lists of Carron (2005, 2008) dealing with the Hydradephaga of Switzerland. Based on a large and robust dataset, the faunal knowledge of this group in Switzerland can now be considered solid. Occurrence maps for the species retained as part of the Swiss fauna are available on the info fauna map server (www.infofauna.ch; https://lepus.infofauna.ch/carto). All the data have been transmitted to GBIF, making this work part of a global understanding of biodiversity. This study is part of a wider project to update our knowledge of the fauna of aquatic beetles in Switzerland, following on from the work on Hydrophiloidea by Cosandey et al. (2023), but is also a further step towards a complete comprehension of the beetle fauna of Switzerland (e.g., Chittaro et al. 2021; Sanchez and Chittaro 2022).

We can confirm the native status of most of the species retained by Carron (2005, 2008, 2009), with the exceptions of seven species (*Deronectes opatrinus*, *Graptodytes flavipes*, *Gyrinus urinator*, *Hydaticus continentalis*, *Hygrotus parallelogrammus*, *Hyphydrus aubei*, and *Stictonectes lepidus*), which we excluded for various reasons (see comments for each species). On the other hand, we can now confirm the presence in Switzerland of *Dytiscus circumflexus* and *Rhantus suturellus*, excluded by Carron, as well as the recently described *Boreonectes alpestris*. The Swiss list of Hydradephaga now contains a total of 139 species whose presence (past or present) can be considered certain. As observed worldwide, Dytiscidae is the most diverse family of Hydradephaga in Switzerland (113 species), followed by Haliplidae (16 species), Gyrinidae (7 species), Noteridae (2 species), and Hygrobiidae (1 species).

The distribution map of Hydradephaga species richness in Switzerland shows that most of the areas with high species diversities are located in lowlands and in thermophilous areas of Switzerland (Fig. 1A). However, several species (also) occur at high elevations (Fig. 1B), underlining the importance of Switzerland for the conservation of some localized and highly specialized alpine species. Certain species are restricted to peat bogs like *Hydroporus obscurus* and *Ilybius crassus* (Fig. 2, blue squares), or to high elevation alpine ponds like *Ilybius erichsoni* (Fig. 2, green squares), *Agabus congener* (Fig. 3, blue squares), and *A. lapponicus* (Fig. 3, green squares). These two last species are both present in the Alps, but do not appear to occur in the same ponds. According to Nilsson (1987) the temperature of the waterbody could be the limiting factor, with *A. lapponicus* restricted to cooler habitats. *Ilybius erichsoni* appears to be reaching the western limit of its distribution in the Swiss Alps. It is localized and only occurs in a few isolated alpine ponds (Fig. 2, green squares) where it can be abundant. Another rare alpine species is *Hydroporus kraatzi*, which was recently rediscovered in France by Queney (2006) and is sporadically present in Switzerland. It is widely distributed in the Alps, but its catches are exceptional (although it can be abundant). This semisubterranean species may be easier to catch after heavy rainfalls (V. Cosandey pers. obs.), perhaps displaced into the streams from its habitat situated not directly in the water (Fery 2009). It is interesting to note

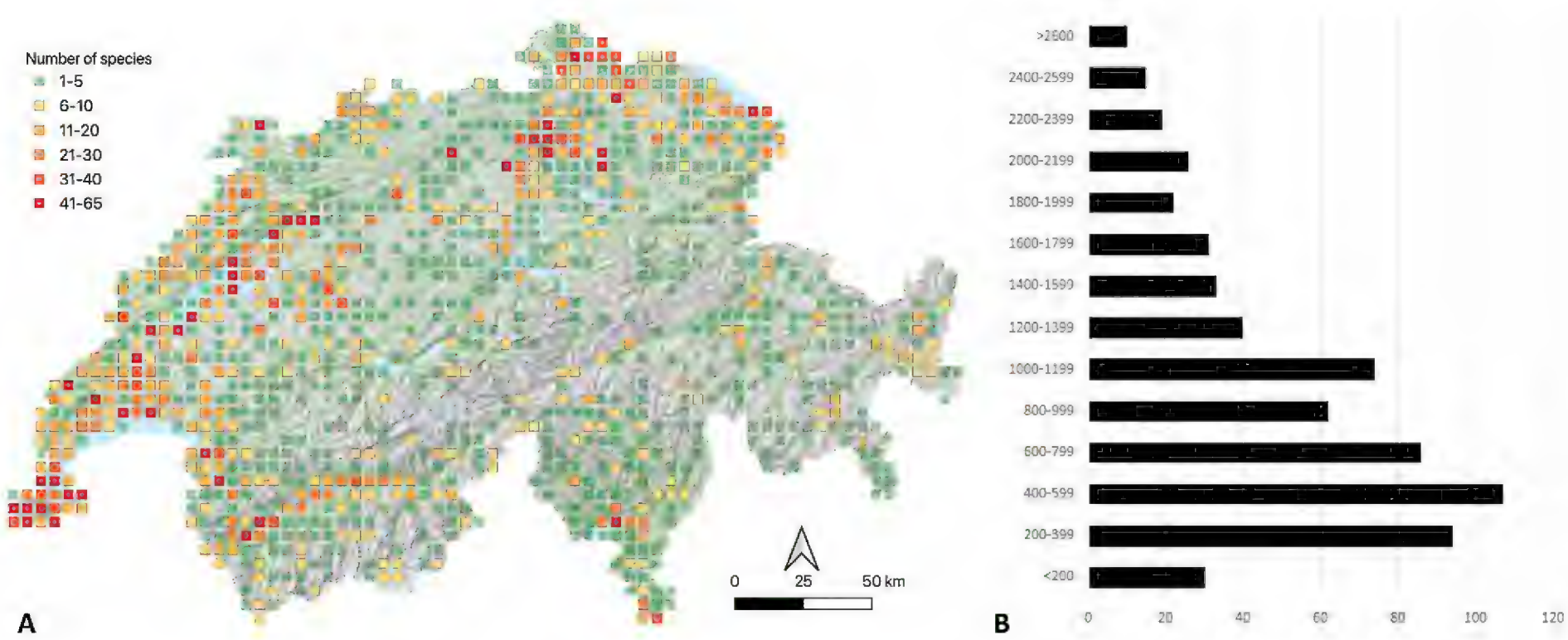

Figure 1. Distribution of species richness of Hydradephaga in Switzerland. **A.** Map with the total number of species recorded per 5×5 km grid, all data and all years combined. The lowland areas of Switzerland are generally those with the highest diversity of Hydradephaga, but some rich areas are also found on higher elevations; **B.** Altitudinal distribution of species richness. All altitudinal information (where provided) for each species was considered and aggregated by 200 m altitudinal class.

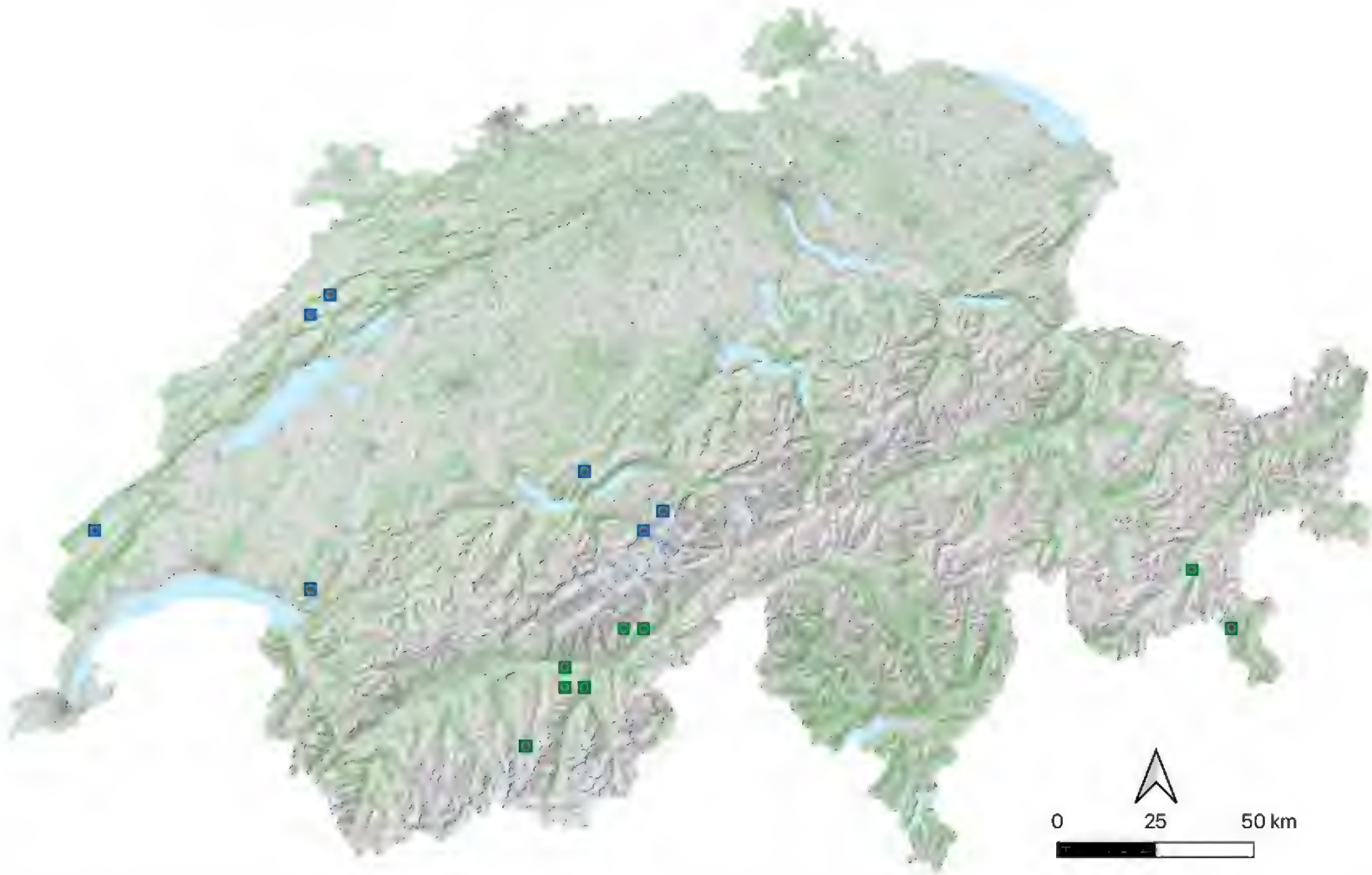

Figure 2. Occurrence maps of two alpine rare species with restricted distribution in Switzerland. *Ilybius crassus* (blue squares) is only found in a few peat bogs of the Jura mountains and in rare ponds of the Northern Alps, while *Ilybius erichsoni* (green squares) is restricted to some alpine ponds situated at high elevations, where it can be abundant.

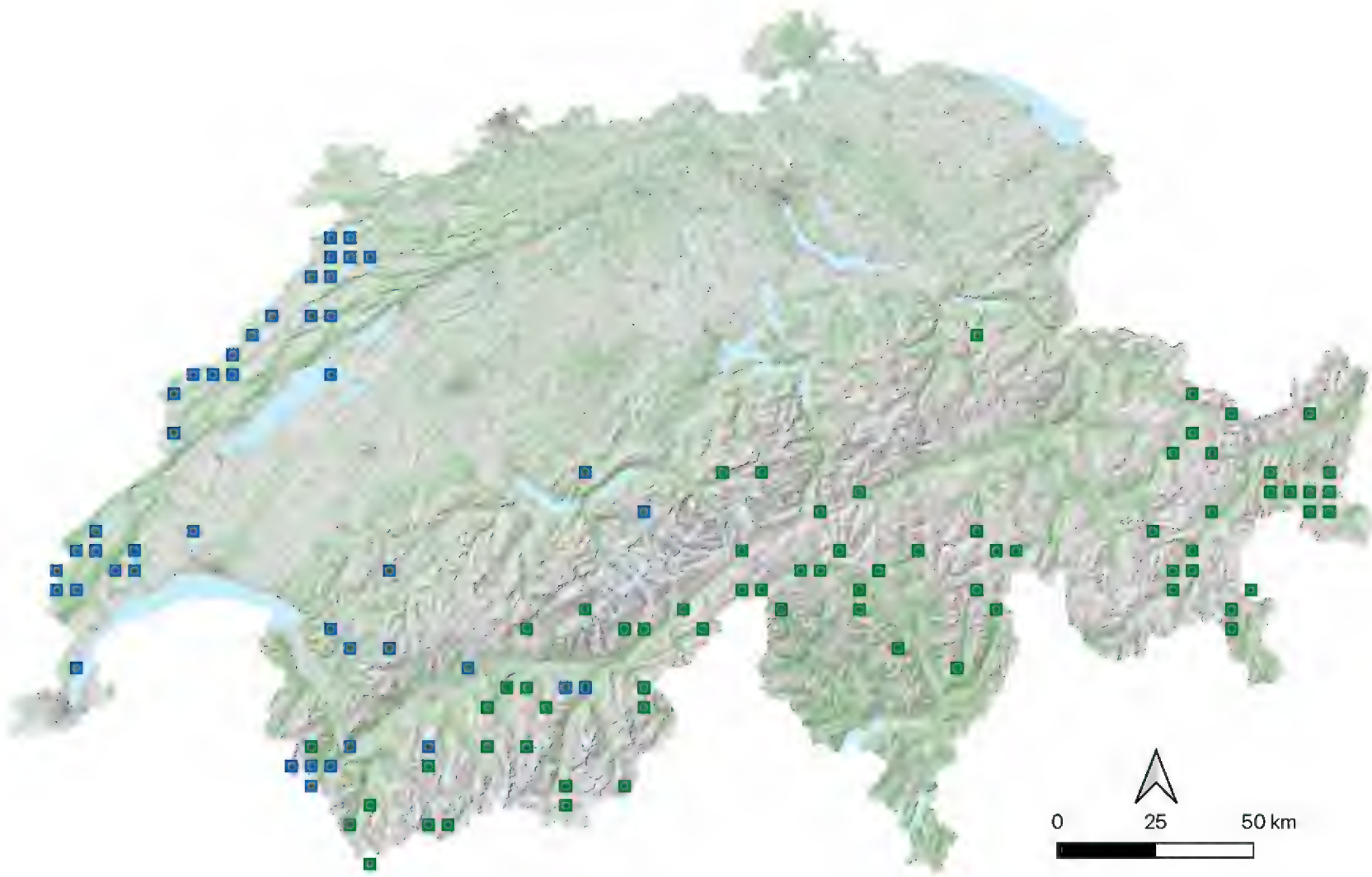

Figure 3. Occurrence maps of two common sister-species Dytiscidae from mountainous regions. *Agabus congener* (blue squares) and *Agabus lapponicus* (green squares). They do not seem to occur together in the same ponds even if their distributions overlap.

that Switzerland appears to be at the southern limit of the distributions for many northern species, which only reach the northern slopes of the Alps (*Ilybius crassus*, *Nebrioporus assimilis*) or the lowlands in the northeast of the country (*Agabus undulatus*, *Dytiscus circumflexus*, *Hydaticus transversalis*, *Hydroporus figuratus*, *Hydroporus scalesianus*, *Hygrotus quinquelineatus*, and *Ilybius guttiger*, for example).

In parallel to the work done in museums, our targeted field surveys (visiting 361 km^2, for a total of 4,327

occurrences) carried out during the last five years have provided new data for most of the Swiss species (n = 123), representing 88% of the Hydradephaga signaled in the country. This research led to some surprises, such as the rediscovery in Switzerland of *Agabus brunneus* (Fig. 4A), *Haliplus mucronatus* (Fig. 4B), *Ilybius crassus*, *Hydaticus transversalis*, *Hydroporus figuratus* (Fig. 4C), *Hydroporus longicornis*, and *Nebrioporus assimilis*, as well as the rediscovery of *Dytiscus circumcinctus* by our colleague Emil Birnstiel. All these species had not been reported in Switzerland for 25 years or more. However, our research did not uncover any new species for Switzerland, although several species are known from neighboring regions and remain potential. This is the case for example for *Ilybius montanus* (Stephens, 1828) cited from Alsace by Callot (2018), for *Agabus unguicularis* (C.G. Thomson, 1867) known from southern Germany (Köhler and Klausnitzer 1998; Köhler 2011), and especially for *Hydroporus striola*, *H. gyllenhalii*, and *Ilybius wasastjernae* (C.R. Sahlberg, 1824). Some of these species could effectively be present in Switzerland. However, the species accumulation curve (Fig. 5) clearly seems to plateau, indicating that our knowledge of this fauna is very good and probably not far from exhaustive.

The 16 Swiss species (= 12%) that we have not found in the last 5 years indicate the probable loss of a large proportion of them, such as *Hydaticus grammicus* (last Swiss observation in 1942), *Dytiscus latissimus* (1948), *Dytiscus circumflexus* (1954), *Rhantus bistriatus* (1957), *Ilybius subaeneus* (1958), *Rhantus notaticollis* (1971), *Rhantus frontalis* (1977), *Hygrotus confluens* (1984), *Nebrioporus canaliculatus* (1990), and *Rhitrodytes crux* (1994), which have not been reported in Switzerland for at least 25 years (minimum duration considered in the German Red List of Spitzenberg et al. (2016) for a species to be considered extinct). For others, there are more recent observations, but their disappearance is already to be expected, such as *Scarodytes halensis*, reported for the last time by Carron in the canton of Geneva in 2007 and which has not been found in the last five years despite intensive surveys in the canton (see Cosandey 2023). In general, a large number of Hydradephaga species have declined over time, and even if they still exist in our country, they have become extremely rare such as *Dytiscus semisulcatus* (see comparison with the congeneric and very similar *Dytiscus marginalis*, which remained stable over time Fig. 6), *Haliplus mucronatus* (see comparison with *Haliplus heydeni*, Fig. 7), or even probably have disappeared like *Gyrinus minutus* (see comparison with *Gyrinus substriatus*, the only common species of the genus in Switzerland:, Fig. 8A, B). A comparison of the relative proportions of localities (considered as 5 × 5 km areas) between two 30-year periods (1964–1993 versus 1994–2023, 1994 being the year of publication of Brancucci's red list for Switzerland) for each species known from more than five localities during the two periods shows that several species that are still widespread have nevertheless declined sharply in Switzerland. The steepest declines were seen among *Agabus paludosus* (-62%), *Agabus biguttatus* (-60%), *Hydroporus melanarius* (-44%), *Hydroporus nigellus* (-42%), *Agabus lapponicus* (-39%), *Bidessus grossepunctatus* (-35%),

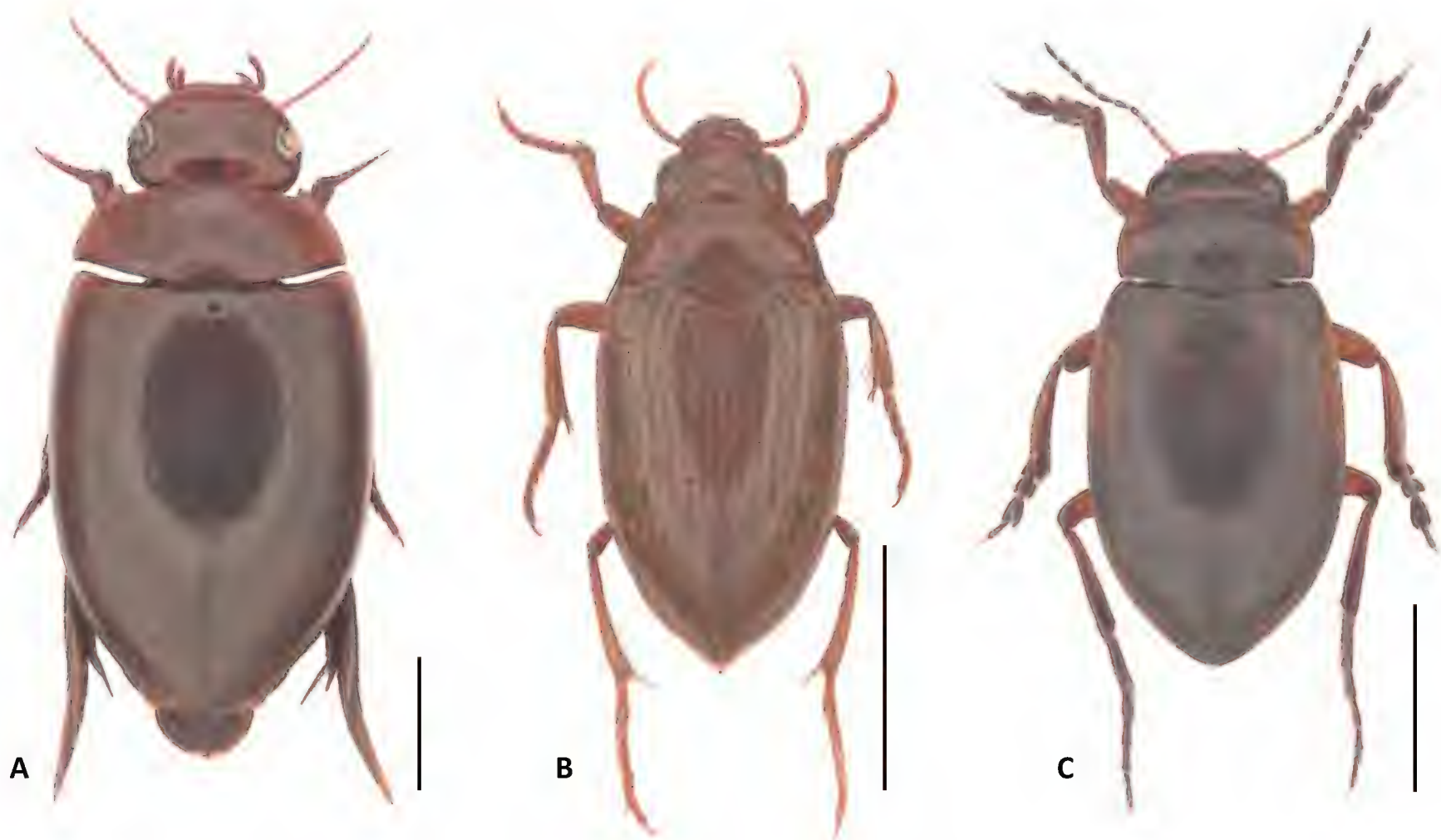

Figure 4. Examples of Hydradephaga species recently rediscovered in Switzerland. Habitus of **A.** *Agabus brunneus* (rediscovered in 2021, previous record in 1915); **B.** *Haliplus mucronatus* (rediscovered in 2021, previous record in 1952), and **C.** *Hydroporus figuratus* (rediscovered in 2023, previous record in 1970). Scale bars: 2 mm. (Photos V. Cosandey)

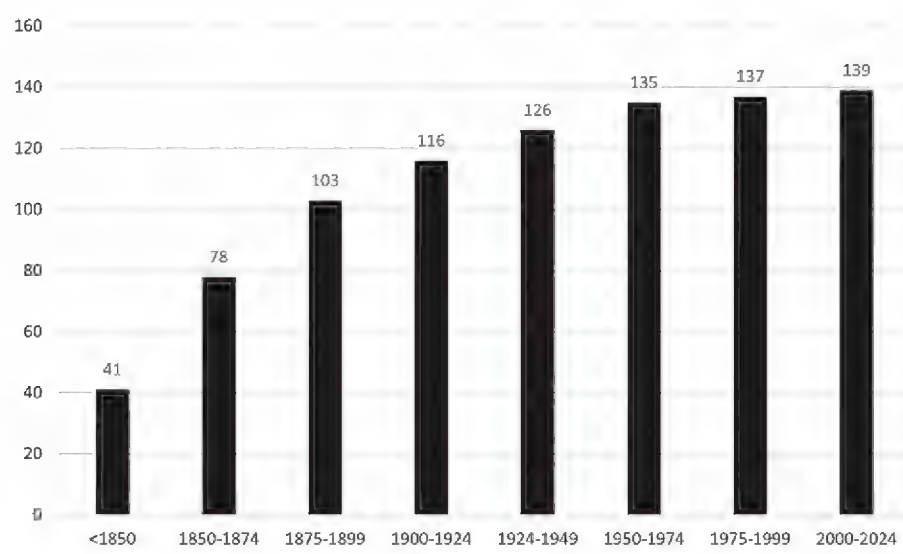

Figure 5. Accumulation of Hydradephaga species recorded in Switzerland through time. The year in which each species was first recorded in Switzerland was taken into account and grouped into 25-year periods. The curve clearly plateau since a few decades, indicating that this group is well-known in Switzerland.

Ilybius fuliginosus (-32%), *Deronectes aubei* (-28%), *Ilybius aenescens* (-28%), and *Rhantus latitans* (-28%).

This negative trend is easily explained; in Switzerland, 80–88% of wetlands have been destroyed (Küchler et al. 2018), most of them having been drained to gain arable land or for urban development. As a result, 90% of wetland types are on the national red list of habitat types (Delarze et al. 2016). The correction of watercourses and the poisoning of waters by industry and agriculture are also major factors (Brancucci 1994), like the ongoing eutrophication of suitable waters and the gradual decrease in rainfall in recent years in the planar and hilly regions (Spitzenberg et al. 2016).

However, some species may also expand, such as *Hydrovatus cuspidatus*, which has gained ground in recent decades (Carron and Merz 2012), but also apparently *Graptodytes bilineatus*, *Rhantus grapii*, and *Peltodytes rotundatus*. Colonization (or recolonization) capacity depends to a large extent on the flight capacity of the various species. Iversen et al. (2017) highlighted the large difference in flight capability between *Acilius* spp. and *Graphoderus* spp., which is directly visible in the colonization rates of newly created ponds. In Switzerland too, *Acilius* spp. are more common and widespread than *Graphoderus* spp., with *G. bilineatus* and *G. zonatus* declining for decades in Switzerland.

Now that all the historical data held in the collections of Swiss natural history museums have been databased, Hydradephaga need an urgent revision of their red list; our data shows that some statuses proposed by Brancucci (1994) are inadequate. For example, *Graphoderus cinereus* appears on the red list as being more threatened than *G. austriacus* or *G. bilineatus*, as already mentioned by Carron (2005). However, our results show that *G. austriacus* is potentially extinct in Switzerland, while *G. bilineatus* is in steep decline (Knoblauch and Gander 2019): only three populations are currently known in Switzerland, whereas *G. cinereus* is fairly common and widespread in Switzerland. It is likely that Brancucci

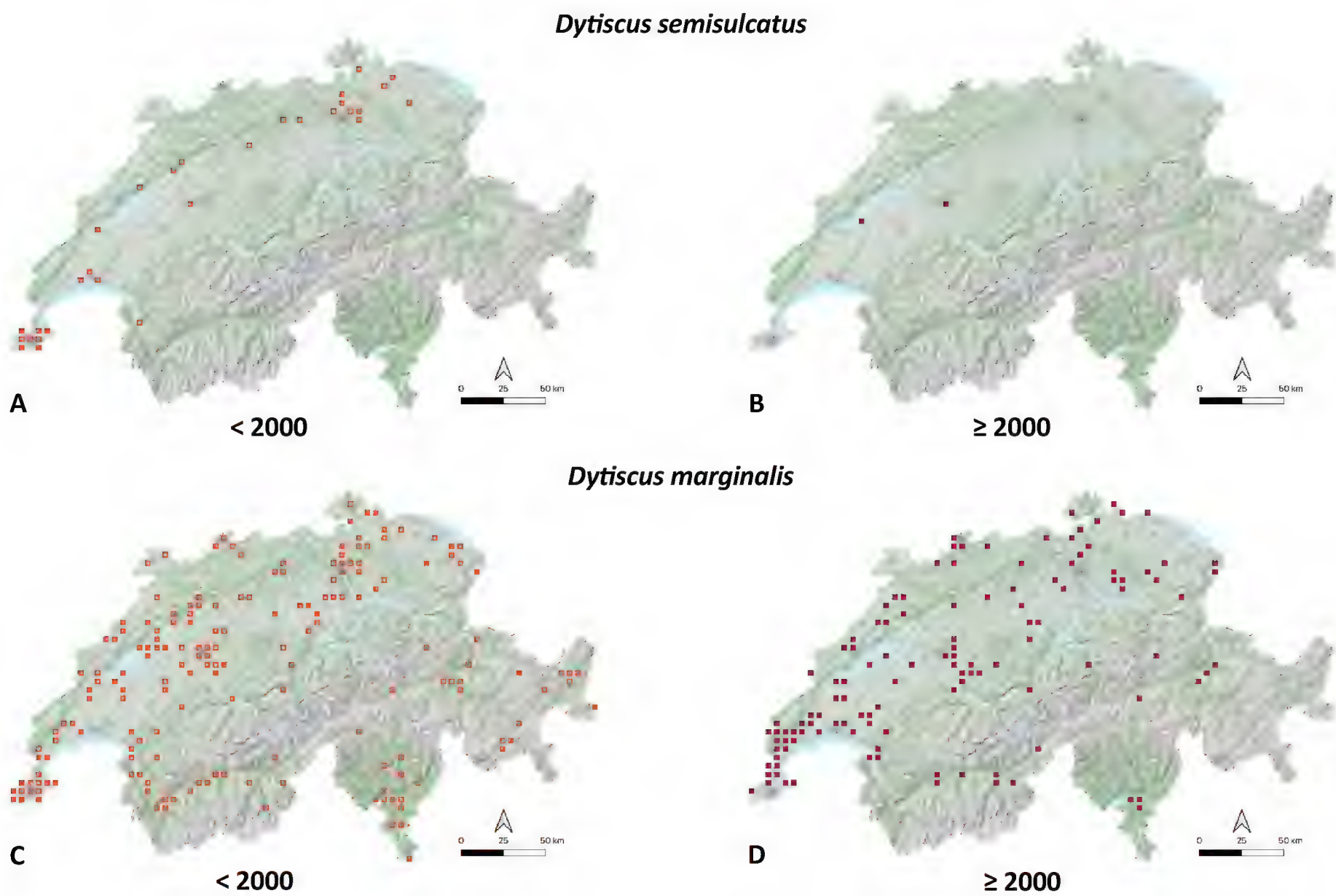

Figure 6. Changes in the distribution of two congener Dytiscidae over time. Occurrences of a species in steep decline, *Dytiscus semisulcatus* **A.** Before 2000 and **B.** After 2000. Occurrences of a morphologically similar species remaining common, *Dytiscus marginalis*; **C.** Before 2000 and **D.** After 2000.

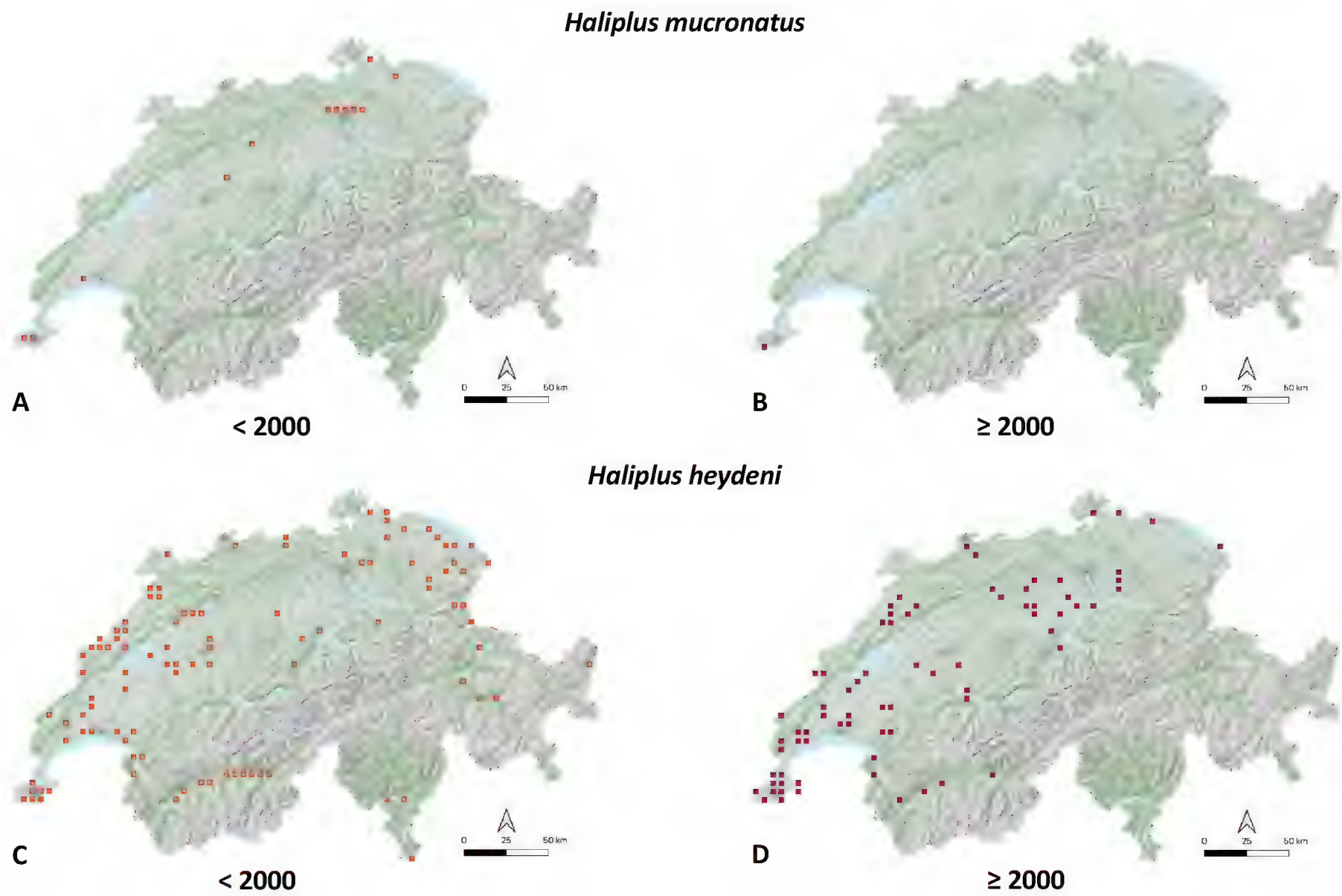

Figure 7. Changes in the distribution of two Haliplidae species over time. Occurrences of *Haliplus mucronatus*, a species recently rediscovered in Switzerland **A.** Before 2000 and **B.** After 2000. Occurrences of *Haliplus heydeni*, a common and widely distributed species in Switzerland **A.** Before 2000 and **B.** After 2000.

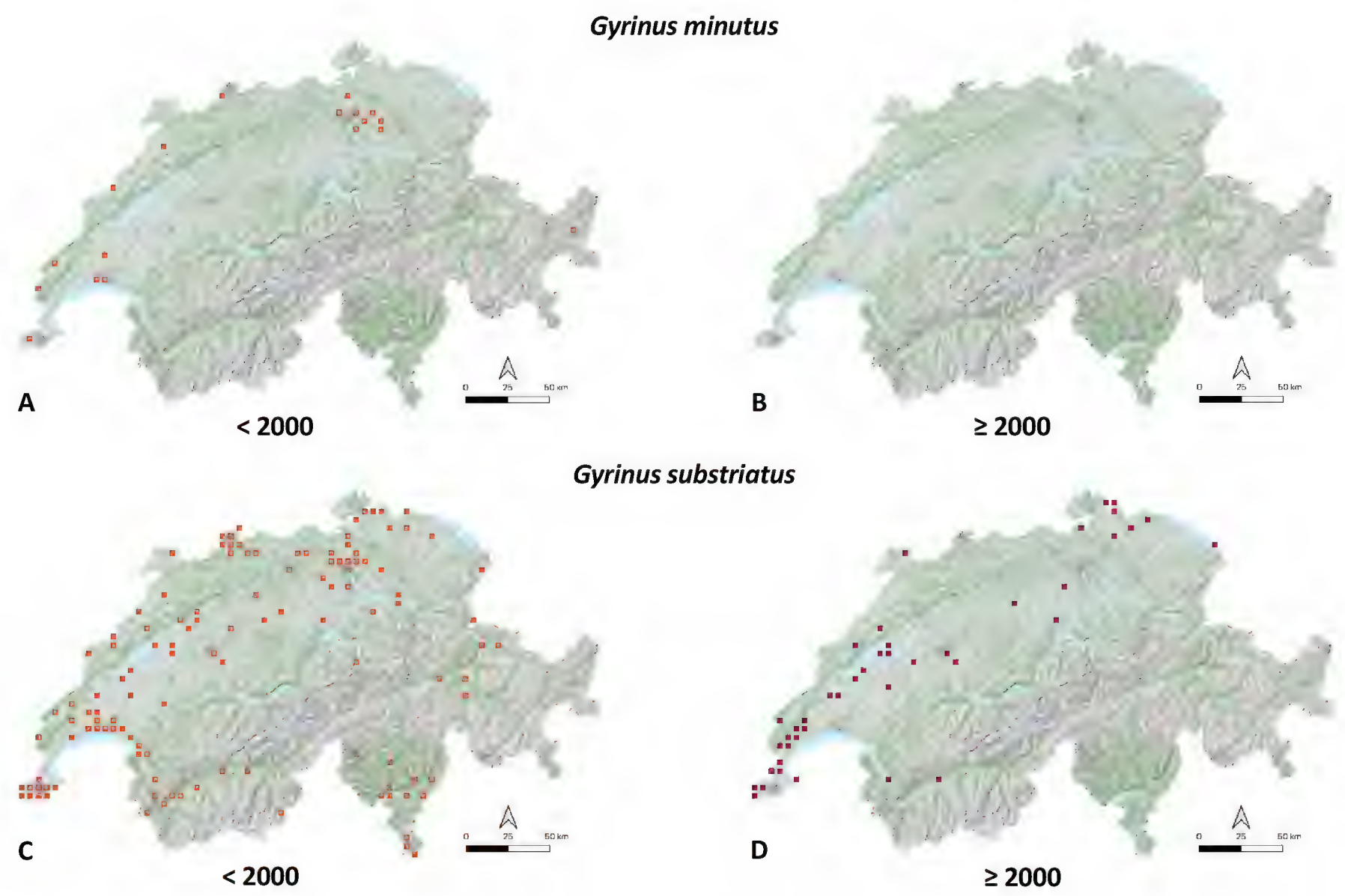

Figure 8. Changes in the distribution of two Gyrinidae species over time. Occurrences of a probably extinct species, *Gyrinus minutus* **A.** Before the years 2000 and **B.** After. Occurences of *Gyrinus substriatus*, the most common Gyrinidae in Switzerland **C.** Before the years 2000 and **D.** After 2000.

attributed these statuses in direct inspiration from his work on the ecology of Dytiscidae in the Grande-Cariçaie reserve (VD/FR/NE), where he found more *G. bilineatus* than *G. cinereus* (Brancucci 1980). In addition, Brancucci's (1994) red list includes many non-native species that have never been present in Switzerland, such as *Agabus subtilis*, *Ilybius similis*, *Dytiscus lapponicus*, *Hydroporus striola*, *Aulonogyrus striatus*, and *Gyrinius caspius*, as Carron (2005, 2008) already mentioned, and as our systematic data collection confirms. A revision of the Red List is therefore highly desirable.

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References

Allenspach V (1978) Fünfter Beitrag zur Coleopteren-Fauna der Schweiz von Arthur Linder. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 51: 407–410.

Angus R (2010) *Boreonectes* gen. n., a new genus for the *Stictotarsus griseostriatus* (De Geer) group of sibling species (Coleoptera: Dytiscidae), with additional karyosystematic data on the group. Comparative Cytogenetics 4(2): 123–131. https://doi.org/10.3897/compcytogen.v4i2.46

Baca SM, Alexander A, Gustafsson GT, Short AEZ (2017) Ultraconserved elements show utility in phylogenetic inference of Adephaga (Coleoptera) and suggest paraphyly of 'Hydradephega'. Systematic Entomology 4: 786–795. https://doi.org/10.1111/syen.12244

Balke M, Hendrich L (1996) A New Species of the Terrestrial Water Beetle Genus *Geodessus* Brancucci (Coleoptera: Dytiscidae), Sieved from Leaf Litter in Southern India. Aquatic Insects 18(2): 91–99. https://doi.org/10.1080/01650429609361607

Bameul F, Queney P (2014) Gyrinidae, Haliplidae, Noteridae, Paelobiidae, Dytiscidae. In: Tronquet M (Ed) Catalogue des Coléoptères de France. Association Roussillonnaise d'Entomologie, Perpignan, 81–102.

Beutel RG, Ribera I, Bininda-Edmonds ORP (2008) A genus-level supertree of Adephaga (Coleoptera). Organisms, Diversity & Evolution 7: 255–269. https://doi.org/10.1016/j.ode.2006.05.003

Bergsten J, Brilmyer G, Crampton-Platt A, Nilsson AN (2012) Sympatry and colour variation disguised well-differentiated sister species: *Suphrodytes* revised with integrative taxonomy including 5 kbp of housekeeping genes (Coleoptera: Dytiscidae). DNA Barcodes 1: 1–18. https://doi.org/10.2478/dna-2012-0001

Beutel RG (1997) Über Phylogenese und Evolution der Coleoptera (Insecta). Abhandlungen des Naturwissenschaftlichen Vereins Hamburg (NF) 31: 1–164.

Bilton DT, Ribera I, Short AE (2019) Water Beetles as Models in Ecology and Evolution. Annual Review of Entomology 64: 359–77. https://doi.org/10.1146/annurev-ento-011118-111829

Bleich O, Gürlich S, Köhler F (2016) Verzeichnis und Verbreitungsatlas der Käfer Deutschlands. http://www.colkat.de/de/fhl/

Bouchard P, Bousquet Y, Davies A, Alonso-Zarazaga M, Lawrence J, Lyal C, Newton A, Reid C, Schmitt M, Slipinski A, Smith A (2011) Family-group names in Coleoptera (Insecta). ZooKeys 88: 1–972. https://doi.org/10.3897/zookeys.88.807

Brancucci M (1979a) Considérations sur la faune des Dytiscidae de la grève de Cudrefin (VD) (Insecta: Coleoptera). Bulletin de la Société vaudoise des Sciences naturelles 74: 301–311.

Brancucci M (1979b) *Geodessus besucheti* n. gen., n. sp., le premier Dytiscide terrestre (Col., Dytiscidae, Bidessini). Entomologica Brasilensia 4 : 213–218.

Brancucci M (1979c) *Hydroporus longicornis* Sharp et *H. longulus* Muls. pour la première fois en Suisse et notes complémentaires sur *H. kraatzi* Schaum (Col., Dytiscidae). Mitteilungen der Entomologischen Gesellschaft Basel 29: 105–107.

Brancucci M (1980) Observations sur l'écologie des Dytiscides dans les points d'eau de la rive sud du lac de Neuchâtel (Coleoptera : Dytiscidae). Mitteilungen der Schweizerischen Entomologischen Gesellschaft 53(4): 365–378.

Brancucci M (1994) Liste rouge des hydradéphages menacés de Suisse. In: Duelli P (Ed.) Listes rouges des espèces animales menacées de Suisse. Office fédéral de l'environnement, des forêts et du paysage, Berne, 60–63.

Brancucci M, Rotzer A (1989) *Agabus nigroaeneus* Er. zum ersten Mal in der Schweiz (Col., Dytiscidae). Mitteilungen der Entomologischen Gesellschaft Basel 39: 66–67.

Brandstetter CM, Kapp A (1995) Die Schwimmkäfer von Vorarlberg und Liechtenstein. 2. Band (Haliplidae, Noteridae, Dytiscidae, Gyrinidae). Erster Vorarlberger Coleopterologischer Vereine, Bürs, 310 pp.

Bremi-Wolf JJ (1856) Catalog der Schweizerischen Coleopteren, als Vorläufer der Beiträge für Schweizerische Entomologie. Druck und Commission von Friedrich Schulthess, Zürich, 78 pp.

Caflisch JL (1894) Beiträge zu einem Verzeichnisse der Insecten-Fauna Graubündens von Dr. E. Killias. IV: Coleopteren. Supplement/Beilage zu Jahresbericht der Naturforschenden Gesellschaft Graubündens, 275 pp.

Callot HJ (1990) Catalogue et atlas des Coléoptères d'Alsace, Tome 2. Hydradephaga. Dytiscidae, Haliplidae, Gyrinidae. Société alsacienne d'entomologie & Musée zoologique de l'Université et de la ville de Strasbourg, 69 pp. [avec mise à jour du 1.10.2003]

Callot H (2018) Liste de référence des Coléoptères d'Alsace. Société Alsacienne d'Entomologie, 107 pp. http://soc.als.entomo.free.fr [version du 30-IX-2018]

Carron G (1999) Les Coléoptères aquatiques de quelques étangs d'Ajoie (Commune de Bonfol, JU). Bulletin romand d'Entomologie 17: 127–146.

Carron G (2005) Kommentierte Checkliste der Dytiscidae und Noteridae (Coleoptera) der Schweiz. Mitteilungen der Entomologischen Gesellschaft Basel 55(3): 93–114.

Carron G (2008) Checklist des coléoptères aquatiques de Suisse. Deuxième partie : Gyrinidae, Haliplidae, Paelobiidae, Sphaeriusidae. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 81: 53–60.

Carron G (2009) Les coléoptères aquatiques des marais du lac de Pfäffikon (canton de Zürich), avec première mention pour la Suisse de *Hydroporus scalesianus* Stephens, 1828 et recommendations pour la conservation. Entomo Helvetica 2: 239–253.

Carron G, Merz B (2012) Superfamille Caraboidea (excl. Carabidae). In: Merz B (Ed.) Liste annoté des insectes (Insecta) du canton de Genève. Instrumenta Biodiversitatis vol. VIII, Muséum d'Histoire naturelle de Genève, 87–89.

Carron G, Paillex A, Castella E (2007) Les coléoptères aquatiques de la zone alluviale du Rhône à Belley (France : Ain, Savoie) : inventaire et observations préliminaires sur les effets des mesures de restauration. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 80: 191–210.

Cerrato C, Meregalli M (2020) A fast and reliable method for mark-recapture water beetles (Coleoptera: Dytiscidae) and other Arthropoda. Bollettino della Società Entomologica Italiana 152(2): 69–74. https://doi.org/10.4081/bollettinosei.2020.69

Chittaro Y, Sanchez A, Geiser M (2021) An updated checklist of the Cantharidae and Lycidae of Switzerland (Coleoptera, Elateroidea). Alpine Entomology 5: 77–94. https://doi.org/10.3897/alpento.5.67808

Cosandey V (2023) Bilan de trois années de captures de Coléoptères aquatiques dans le canton de Genève. Entomo Helvetica 16: 107–121.

Cosandey V, Chittaro Y, Sanchez A (2023) Annotated checklist of the Hydrophiloidea of Switzerland (Coleoptera). Alpine Entomology 7 : 167–184. https://doi.org/10.3897/alpento.7.111147

Delarze R, Eggenberg S, Steiger P, Bergamini A, Fivaz, F, Gonseth Y, Guntern J, Hofer G, Sager L, Stucki P (2016) Liste rouge des milieux de Suisse. Abrégé actualisé du rapport technique 2013 sur mandat de l'Office fédéral de l'environnement (OFEV), Berne, 33 pp.

Dettner K (1997) Insecta: Coleoptera: Hygrobiidae. In: Schwoerbel J, Zwick P (Eds) Süßwasserfauna von Mitteleuropa 20/2-4. Gustav Fischer, Stuttgart/Jena/New York, 127–144.

Dietrich K (1865) Beitrag zur Kenntniss der Insekten-Fauna des Kantons Zürich. Käfer. Neue Denkschriften der allgemeinen schweizerischen Gesellschaft für die gesammten Naturwissenschaften 21: 1–240.

Döös C, Riesen M, Babbi M (2017) Ist der Breitrandkäfer *Dytiscus latissimus* Linnaeus, 1758 (Coleoptera: Dytiscidae) in der Schweiz ausgestorben? Entomo Helvetica 10: 21–30.

Dutton LA, Angus RB (2007) A karyosystematic investigation of a group of sibling species related *Stictotarsus griseostriatus* (De Geer) (Coleoptera: Dytiscidae). Comparative Cytogenetics 1: 3–16.

Favre E (1890) Faune des coléoptères du Valais et des régions limitrophes. Zürcher et Furrer, 448 pp.

Fery H (2009) New species of the *Hydroporus longulus*-group from Iran, Armenia and Turkey with a synopsis of the group (Coleoptera: Dytiscidae). Acta Entomologica Musei Nationalis Pragae 49(2): 529–558.

Fery H, Brancucci M (1997) A taxonomic revision of *Deronectes* Sharp, 1882 (Insecta: Coleoptera: Dytiscidae) (part I.). Annalen des Naturhistorischen Museums in Wien 99 B: 217–302.

Fontana P (1922) Contribuzione alla Fauna coleotterologica ticinese. Bolletino della Società Ticinese di Scienza Naturali 19: 35–48.

Fontana P (1947) Contribuzione alla Fauna coleotterologica ticinese. Bollettino della Società ticinese di scienza naturali 42: 16–943.

Foster GN and Friday LE (2011) Keys to adults of the water beetles of Britain and Ireland (Part 1). Handbooks of the Identification of British Insects Vol. 4, Part 5 (2nd edn.). Royal Entomological Society, Londres, 144 pp.

Franciscolo ME (1979) Fauna d'Italia 14: Coleoptera Haliplidae, Hygrobiidae, Gyrinidae, Dytiscidae. Calderini, Bologna, 804 pp.

Freude H (2011) Die Käfer Mitteleuropas, Band 3. Adephaga II, Palpicornia. Spektrum Akademischer Verlag, Heidelberg, 367 pp.

Fuessly JC (1775) Verzeichnis der ihm bekannten schweizerischen Insekten mit einer ausgemahlten Kupfertafel, nebst der Ankündigung eines neuen Insekten Werks. Zürich und Wintherthur, Heinrich Steiner und Companie, 62 pp. https://doi.org/10.5962/bhl.title.65772

Knoblauch A, Gander A (2019) Distribution of residual population of the Dytiscid *Graphoderus bilineatus* (De Geer, 1774) in the Grande Cariçaie reserves, Switzerland. Alpine Entomology 3: 83–91. https://doi.org/10.3897/alpento.3.30417

Gassmann M (1974) La faune des Coléoptères aquicoles du Marais de Kloten. Etude faunistique et écologique considérant principalement les relations entre la faune et la végétation. Thèse EPF.Z N°5232, Zürich, 166 pp.

Guignot F (1931–1933) Les Hydrocanthares de France. Miscellanea Entomologica. Toulouse, 1049 pp.

Guignot F (1947) Coléoptères Hydracanthares. Faune de France 48, 287 pp.

Hájek J (2007) Icones Insectorum Europae Centralis. Coleoptera : Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae, Paleobiidae. Folia Heyrovskyana (B) 9 : 1–13.

Hájek J (2009) Icones Insectorum Europae Centralis. Coleoptera : Dytiscidae. Folia Heyrovskyana (B) 11: 1–32.

Hájek J (2017a) Dytiscidae. In: Löbl I, Löbl D (Eds) Catalogue of Palaearctic Coleoptera. Volume 1. Archostemata, Myxophaga, Adephaga. Revised and Updated Edition. Brill, Leiden, Boston, 846–914.

Hájek J (2017b) Hygrobiidae. In: Löbl I, Löbl D (Eds) Catalogue of Palaearctic Coleoptera. Volume 1. Archostemata, Myxophaga, Adephaga. Revised and Updated Edition. Brill, Leiden, Boston, 846 pp.

Hájek J (2017c) Noteridae. In: Löbl I, Löbl D (Eds) Catalogue of Palaearctic Coleoptera. Volume 1. Archostemata, Myxophaga, Adephaga. Revised and Updated Edition. Brill, Leiden, Boston, 844–845.

Hájek J, Fery H (2017) Gyrinidae. In: Löbl I, Löbl D (Eds) Catalogue of Palaearctic Coleoptera. Volume 1. Archostemata, Myxophaga, Adephaga. Revised and Updated Edition. Brill, Leiden, Boston, 22–29.

Handschin E (1963) Die Coleopteren des schweizerischen Nationalparkes und seiner Umgebung. Ergebnisse der wissenschaftlichen Untersuchungen im schweizerischen Nationalpark. Band VIII. Lüdin, Liestal, 302 pp.

Heer O (1837) Die Kaefer der Schweiz. Mit besonderer Berücksichtigung ihrer geographischen Verbreitung. Erster Theil. Erste Lieferung. Neuchatel, Petitpierre, 96 pp.

Heer O (1841) Fauna coleopterorum helvetica. Pars 1. Turici: Impensis Orelii, Fuesslini et Sociorum, 652 pp.

Holmen M (1987) The Aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark. Volume I. Gyrinidae, Haliplidae, Hygrobiidae and Noteridae. Fauna Entomologica Scandinavica 20. Brill, Leiden, 532 pp. https://doi.org/10.1163/9789004273443

Hugentobler H (1966) Beitrag zur Kenntnis der Käfer der Nordostschweiz. Naturwissenschaftlichen Gesellschaft St. Gallen, 248 pp.

Iversen LL, Rannap R, Briggs L, Sand-Jensen K (2017) Time-restricted flight ability influencesdispersal and colonization rates in a group of freshwaterbeetles. Ecology and Evolution 7: 824–830. https://doi.org/10.1002/ece3.2680

Jackson DJ (1952) Observations on the capacity for flight of water beetles. The Proceedings of the Royal Entomological Society of London, Series A, General Entomology 27: 57–70. https://doi.org/10.1111/j.1365-3032.1952.tb00155.x

Jäch MA, Balke M (2008) Global diversity of water beetles (Coleoptera) in freshwater. Hydrobiologia (595): 419–442. https://doi.org/10.1007/s10750-007-9117-y

Kahlen M, Hellrigl K (1996) Ordnung Coleoptera-Käfer. In: Hellrigl K (Ed.) Die Tierwelt Südtirols. Naturmuseum Südtirol, Bozen, 393–511.

Kehl S, Dettner K (2007) Flugfähigkeit der in Deutchland vorkommenden adephagen Wasserkäfer (Coleoptera, Hydradephaga). Entomologie Heute 19: 141–161.

Köhler F (2000) Erster Nachtrag zum Verzeichnis der Käfer Deutschlands. Entomologische Nachrichten und Berichte, Dresden 44(1): 60–84.

Köhler F (2011) 2. Nachtrag zum „Verzeichnis der Käfer Deutschlands" (Köhler & Klausnitzer 1998) (Coleoptera). Entomologische Nachrichten und Berichte (Dresden) 55: 109–174.

Köhler F, Klausnitzer B (1998) Entomofauna Germanica. Verzeichnis der Käfer Deutschlands. Entomologische Nachrichten und Berichte, Dresden, Beiheft 4: 1–185.

Kovac D, Maschwitz U (1990) Secretion-grooming in aquatic beetles (Hydradephaga): a chemical protection against contamination of the hydrofuge respiratory region. Chemoecology 1: 131–138. https://doi.org/10.1007/BF01241654

Küchler M, Küchler H, Bergamini A, Bedolla A, Ecker K, Feldmeyer-Christe E, Graf U, Holderegger R (2018) Moore der Schweiz - Zustand, Entwicklung, Regeneration. Bristol-Schriftenreihe 55, Haupt Verlag, 258 pp.

Linder A (1941) La collection de coléoptères du Chanoine Cerutti. Bulletin de la Murithienne 59: 129–134.

Linder A (1946) 2. Beitrag zur Coleopteren-Fauna der Schweiz. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 20: 197–207.

Linder A (1953) 3. Beitrag zur Coleopteren-Fauna der Schweiz. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 26(1): 63–71.

Linder A (1967) Nachtrag zum Verzeichnis der Bündner Coleopteren von Dr. E.Killias. Jahresbericht der Naturforschenden Gesellschaft Graubünden XCIII : 78–108.

Löbl I, Löbl D (2017) Catalogue of Palaearctic Coleoptera. Archostemata-Myxophaga-Adephaga. Vol. 1. Revised and updated edition. Brill, Leiden, Boston, [xxxiv +] 1443 pp. https://doi.org/10.1163/9789004330290_002

López-López A, Vogler AP (2017) The mitogenome phylogeny of Adephaga (Coleoptera). Molecular Phylogenetics & Evolution: 114, 166–174. https://doi.org/10.1016/j.ympev.2017.06.009

Maddison DR, Moore W, Baker MD, Ellis TM, Ober KA, Cannone JJ, Gutell R (2008) Monophyly of terrestrial adephagan beetles as indicated by three nuclear genes (Coleoptera: Carabidae and Trachypachidae). Zoologica Scripta 38: 43–62. https://doi.org/10.1111/j.1463-6409.2008.00359.x

Matthey W (1971) Ecologie des insectes aquatiques d'une tourbière du haut-Jura. Revue suisse de Zoologie 78: 367–536.

McKenna DD, Wild AL, Kanda K, Bellamy CL, Beutel RG, Caterino MS, Farnum CW, Hawks DC, Ivie MA, Jameson ML, Leschen RAB, Marvaldi AE, McHugh JV, Newton AF, Robertson JA, Thayer MF, Whiting MF, Lawrence JF, Slipinski A, Maddison DR, Farrell BD (2015) The beetle tree of life reveals that Coleoptera survived end-Permian mass extinction to diversify during the Cretaceous terrestrial revolution. Systematic Entomology 40: 835–880. https://doi.org/10.1111/syen.12132

McKenna DD, Shin S, Ahrens D, Balke M, Beza-Beza C, Clarke DJ, Donathe A, Escalona HE, Friedrich F, Letsch H, Liu S, Maddison D, Mayer C, Misof B, Murin PJ, Niehuis O, Peters RS, Podsiadlowski L, Pohl H, Scully ED, Yan EV, Zhou X, Slipinski A, Beutel RG (2019) The evolution and genomic basis of beetle diversity. PNAS 116(49): 24729–24737 https://doi.org/10.1073/pnas.1909655116

Miller KB, Bergsten J (2016) Diving beetles of the World. Systematics and biology of the Dytiscidae. Baltimore, Johns Hopkins University Press, [xii +] 320 pp.

Monnerat C, Chittaro Y, Sanchez A, Gonseth Y (2015) Critères et procédure d'élaboration de listes taxonomiques nationales: le cas des Buprestidae, Cerambycidae, Lucanidae et Cetoniidae (Coleoptera) de Suisse. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 88: 155–172.

Meier C, Sauter W (1989) Zur Kenntnis der Insektenfauna eines Auwaldreservates an der Aare bei Villnachern AG. Mitteilungen der Aargauischen Naturforschenden Gesellschaft 32: 217–258.

Mulhauser B (1997) Inventaire de la faune de la Grande Cariçaie. Grande Caricaie, Yverdon, 356 pp.

Mulhauser G, Pronini P, Werfeli B, Aeby P, Mulhauser B (1987) Les arthropodes de la mouille de la Vraconnaz. Bulletin romand d'entomologie 5: 61–91.

Müller JA (1904) 3. Beitrag zur Coleopteren-Fauna der Kantone St. Gallen und Appenzell. Bericht über die Tätigkeit der St. Gallischen naturwissenschaftlichen Gesellschaft, 201–218.

Naceur N (1997) Synthèse du suivi scientifique des invertébrés aquatiques dans les mares des réserves gérées par la Fondation: Bilan 1992–1996. Etude et gestion du site marécageux de Noville. Rapport N° 13. Fondation des Grangettes, 23 pp.

Nilsson AN (1987) A morphometric study of the two cryptic species *Agabus congener* (Thunberg) and *A. lapponicus* (Thomson) (Coleoptera: Dytiscidae). Entomologica Scandinavica 18: 67–77. https://doi.org/10.1163/187631287X00034

Nilsson AN (2016) A World Catalogue of the Family Dytiscidae. Version 1.I.2016. [WWW document]. http://www.waterbeetles.eu/documents/W_CAT_Dytiscidae_2016.pdf [accessed on 7 July 2017]

Nilsson AN, Holmen M (1995) The Aquatic Adephaga (Coleoptera) of the Fennoscandia and Denmark. Volume II. Dytiscidae. Fauna Entomologica Scandinavica 32. Brill, Leiden, New York, Köln, 188 pp. https://doi.org/10.1163/9789004273603

Pétremand G, Cosandey V, Freitag A, Reymond A, Walter F, Breitenmoser S (2023) L'entomofaune de la réserve naturelle Pro Natura "Au Chevry" (Trélex, Vaud). Entomo Helvetica 15: 145–172.

Queney P (2006) *Hydroporus kraatzii* Schaum, 1868 redécouvert en France et *Hydrochus megaphallus* van Berge Henegouwen, 1988 nouveau pour notre faune (Coleoptera Dytiscidae et Hydrochidae). Le Coléoptériste 9(3): 203–204.

Ribera I, Hogan JE, Vogler AP (2002) Phylogeny of Hydradephagan water beetles inferred from 18S rDNA sequences. Molecular Phylogenetics and Evolution 23: 4–62. https://doi.org/10.1006/mpev.2001.1080

Ribera I (2003) Are Iberian endemics Iberian? A case-study using water beetles of the family Dytiscidae (Coleoptera). Graellsia 59: 475–502. https://doi.org/10.3989/graellsia.2003.v59.i2-3.261

Rotzer A (1989) Contribution à la connaissance des hétéroptères et coléoptères aquatique du Valais. Travail de diplôme, Université de Lausanne, 115 pp.

Sanchez A, Chittaro Y (2022) Annotated checklist of the Coccinellidae (Coleoptera, Coccinelloidea) of Switzerland. Alpine Entomology 6: 111–127. https://doi.org/10.3897/alpento.6.89476

Scherler P (1995) Les Coléoptères de la Grande Cariçaie (rive sud-est du lac de Neuchâtel). Bulletin Romand d'Entomologie 13: 31–54.

Scherler P, Sekaly V, Toumayeff G (1989) Coléoptères de la réserve du Bois de Chênes, dans la région de Ferreyres-Moiry. Bulletin Romand d'Entomologie 7: 11–29.

Schaeflein H (1983) 2. Beitrag zur Dytiscidenfauna Mitteleuropas (Coleoptera) mit faunistich-ökologischen Betrachtungen. Stuttgarter Beiträge zur Naturkunde A 430: 1–39.

Schaeflein H (1989) 3. Beitrag zur Dytiscidenfauna Mitteleuropas (Coleoptera) mit ökologischen und nomenklaturischen Anmerkungen. Stuttgarter Beiträge zur Naturkunde A 361: 1–41.

Scholten I, van Kleef HH, Dijk GV, Brouwer J, Verberk WCEP (2018) Larval development, metabolism and diet are possible key factors explaining the decline of the threatened *Dytiscus latissimus*. Insect Conservation and Diversity 11: 565–577. https://doi.org/10.1111/icad.12294

Short EZS (2018) Systematics of aquatic beetles (Coleoptera): current state and future directions. Systematic Entomology 43: 1–18. https://doi.org/10.1111/syen.12270

Spitzenberg D, Sondermann W, Hendrich L, Hess M, Heckes U (2016) Rote Liste und Gesamtartenliste der wasserbewohnenden Käfer (Coleoptera aquatica) Deutschlands. In: Gruttke H, Balzer S, Binot-Hafke M, Haupt H, Hofbauer N, Ludwig G, Matzke-Hajek G, Ries M (Eds) Rote Liste gefährdeter Tiere, Pflanzen und Pilze Deutschlands, Band 4: Wirbellose Tiere (Teil 2), Naturschutz und Biologische Vielfalt 70(4), 207–246. Münster, Landwirtschaftsverlag.

Stierlin G (1883) Zweiter Nachtrag zur Fauna coleopterorum helvetica. Neue Denkschriften der schweizerischen Gesellschaft für die gesammten Naturwissenschaften 8(3): 1–98.

Stierlin G (1900) Fauna coleopterorum helvetica. Die Käfer-Fauna der Schweiz nach der analytischen Methode. I. Theil. Bolli & Böcherer, Schaffhausen, 667 pp.

Stierlin G (1906) Coleopteren-Fauna der Gegend von Schaffhausen. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 11: 167–220.

Stierlin G, Gautard VV (1867) Fauna coleopterorum helvetica. Die Käfer-Fauna der Schweiz. Schaffhausen und Vevey, 372 pp.

Täschler M (1872) Beitrag zur Coleopteren-Fauna der Kantone St. Gallen und Appenzell. Berichte der Tätigkeiten der St. Galler Naturwissenschaftlichen Gesellschaft, 39–249.

Toledo M, Hosseinie S (2003) A new species of *Metaporus* Guignot from southern Iran (Coleoptera: Dytiscidae). Koleopterologische Rundschau 73: 59–64.

Uhlig M, Uhlig B (2006) Zur Käferfauna der Schweiz (Coleoptera ohne Staphylinidae). Entomologische Berichte Luzern 56: 1–20.

Van Vondel BJ (2017) Haliplidae. In: Löbl I, Löbl D (Eds) Catalogue of Palaearctic Coleoptera. Volume 1. Archostemata, Myxophaga, Adephaga. Revised and Updated Edition. Brill, Leiden, Boston, 838–843.

Van Vondel BJ (1997) Insecta: Coleoptera: Haliplidae. In: Schwoerbel J, Zwick P (Eds) Süßwasserfauna von Mitteleuropa 20/2-4. Gustav Fischer, Stuttgart/Jena/New York, 1–95.

Vasilikopoulos A, Balke M, Kukowka S, Pflug JM, Martin S, Meusemann K, Hendrich L, Mayer M, Maddison DR, Niehuis O, Beutel RG, Misof B (2021) Phylogenomic analyses clarify the pattern of evolution of Adephaga (Coleoptera) and highlight phylogenetic artefacts due to model misspecification and excessive data trimming. Systematic Entomology (46): 991–1018. https://doi.org/10.1111/syen.12508